BUREAU OF HYGIENE AND TROPICAL DISEASES.

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HELMINTHIASIS.

PERGHER (J.). L'épidémiologie des helminthiases chez les indigènes au Mayumbe (Congo Belge). [**Epidemiology of Helminth Infections in Mayumbe.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Mar. 31. Vol. 12. No. 1. pp. 59–98. With 16 figs. [66 refs.]

This investigation in the extreme western snout of the Belgian Congo was carried out under orders of the chief medical officer of the Colony with a view to determining whether helminthiases, particularly ankylostomiasis, raised the mortality or lowered the physique of the inhabitants. The country embraced plain and mountain, and clay, sand or gravel soil. The ground round the villages was strewn with faeces and held rich plantations of plantains and palm trees. The method used was to make egg counts by Stoll's original method of which the Caldwell's is held to be a modification. It is stated correctly that PEPPER used the stickiness of certain hookworm eggs to concentrate them by their adhesion to glass, but Pergher's suggestion that direct floatation concentrates by this attribute is incorrect. While Stoll's counting method is held to have inevitable errors, it is stated to be the only one by which the worm load of a community can be determined [a statement which, it is here suggested, is neither historically nor practically accurate]. Stoll's method was used both for qualitative and quantitative diagnosis and gave an infection rate for hookworms of 90·1 per cent. in the hilly region and 96·7 in the plains, the numbers examined being 1,156 and 1,116. Accepting the grading of infection of SMILLIE and AUGUSTINE by egg counts it is concluded that in the hills 50 per cent. of persons carried less than 25 worms while in the plains 15 per cent. did so, that in the former region hookworm infection has no notable ill effect, while in the latter some few persons do suffer, and that on the principle that preventive measures should be instituted only when infection is a proved ill, mass treatments should be undertaken only in the plains. [That is to say, the hygienic aspect of infection is ignored.] Charts show the distribution of infection by locality, sex and age. [Some of the reference names would hardly be traced by one not familiar with the literature. Thus DONALD, A. L. stands for AUGUSTINE, Donald L., and HANSCHEN,

(584) Wt. P3/82 1875 11/32 S.E.R. Ltd. Gp. 353. A

W. C. for HAUSHEER, W. C., to mention the most confusing.] Actual tests for disability from light infections were evidently not attempted. Ascaris and trichuris were dealt with. *Clayton Lane.*

MATTLET (G.). Note sur le parasitisme intestinal au Ruanda-Urundi. [**Intestinal Parasites in Ruanda-Urundi**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Mar. 31. Vol. 12. No. 1. pp. 51–57.

Faecal examinations were presumably by smear; 1,519 were made and the percentages of findings were: ascaris 53, trichuris 23·8, ankylostomes 19·1, the amoeba of dysentery 16·9, *Taenia saginata* 10·8, *Trichomonas intestinalis* 6·3, strongyloides 5·8, enterobius 4·8, *Schistosoma mansoni* 2·7. No post mortem examination has been made without finding *T. saginata*, as many as 8 having been noted in one body. Echinococcus is absent. Disinfestation may come too late to save life. *C. L.*

COLOMBO. Les parasitoses intestinales parmi les enfants des écoles indigènes du district du Tanganyka-Moero. [**Intestinal Parasites of Native Scholars of the T. M. District.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Mar. 31. Vol. 12. No. 1. pp. 35–50. With 10 figs.

Of 1,505 children examined by faecal smear, 51·4 per cent. were infected, the figures in different schools varying between 25·4 and 80·2. Of the children 37·6 per cent. appeared to harbour one kind of parasite, 13·8 per cent. more than one. The percentage of those, seemingly carrying one kind of parasite only, who harboured nematodes was 78·4, namely ankylostomes 57·3, ascaris 9·7, strongyloides 7·2, trichuris 3·3, threadworms 0·9; of those harbouring schistosomes it was 17·3, rhizopods 3·8, and tapeworms 0·5. Those in whom more than one parasite was incriminated are detailed in 18 categories. *C. L.*

SANDGROUND (G. J. H.). [**Report on Intestinal Helminths of 54 Natives in Livingstone Hospital.**]—*Northern Rhodesia Med. Rep. on Health & Sanitary Conditions for Year 1930.* p. 95.

During a week's stay Sandground made 54 faecal examinations by the Willis-Mallory method. Though some of the patients had already undergone treatment, there were disclosed 32 cases of hookworm, 19 of strongyloides, and 5 of trichostrongylus infection, and it was believed that the average case, as examined, harboured less than 50 hookworms. The prevalent worm was necator, the worm load was held to be of no serious consequence to the host, and treatment was deemed unnecessary. If carbon tetrachloride is given, the dose advised is 3 to 4 cc. [45 to 60 minim] and not 3 doses of 3 cc. on alternate days as hitherto given locally; [as BLACKIE reports (*ante* p. 314) 3 cc. has killed a Nyasaland African]. In the body of the publication is the sentence "This report [of Sandground] confirms the opinion held by up-country Medical Officers. It will be seen that it contains advice of very considerable importance, and that Professor Sandground advises a policy of laissez-faire." It is, however, remarkable that there is in fact a note to Sandground's report which runs "The medical officer in charge of Livingstone Native Hospital takes a less favourable view of the effects of hookworm on natives admitted to this hospital and considers it produces a definite disability and lowers resistance to other

diseases especially chest complaints." [There is then on a medical matter the opinion on one side of a layman with a week's local experience and on the other of a resident medical man presumably with much, and the administration seems to prefer the former.] *C. L.*

KELLER (A. E.), LEATHERS (W. S.) & BISHOP (E. L.). **A State-Wide Study of the Human Intestinal Helminths in Tennessee.**—*Jl. Preventive Med.* 1932. May. Vol. 6. No. 3. pp. 161–184. With 4 text figs.

By the Stoll-Hausheer method, which examines 0·005 gm. of faeces, the eggs in 31,999 faecal specimens were counted between July 1929, and March 1931. The maximum, average and minimum percentage number of positives for various counties were: for hookworm 34·9, 6·8, 0, for ascaris 63·9, 27·1, 0, for trichuris 24·3, 7·6, 0, for *Hymenolepis nana* 7·7, 2·9, 0. Hookworm infections were greatest between 10 and 14 years of age, the others between 5 and 9. These figures are compared with surveys made between 1910 and 1914 [the unexpressed assumption being that the diagnostic methods employed during the two periods are equally accurate]. In the earlier period the average percentage incidence of hookworm was 25·4, of ascaris 21·3, of trichuris 4·7 and of *H. nana* 2·4. It is concluded that hookworm incidence has greatly fallen, but that the other 3 parasites are still present in the same areas to the same extent. The remedy advised is suitably constructed privies and their use by all, and an education which emphasizes "the importance of hand-to-mouth transmission of ascaris, trichuris and *Hymenolepis nana* and the necessity of good personal hygiene." *C. L.*

YOKOGAWA (S.) & WAKEJIMA (T.). **On Fecal Examination for Parasites of School Children of Formosan-Chinese Parentage, especially Medical and Biological Observations on** *Ascaris lumbricoides*.—*Taiwan Igakkai Zasshi* (*Ji. Med. Assoc. Formosa*). 1932. June. Vol. 31. No. 6 (327). [In Japanese. With 4 figs. on 1 plate. English summary pp. 60–63.]

The paper is based on treatment given to 1,820 children. In the Taihoku region the percentage of infected persons is equally high in town and country but the former harbour fewer worms; there is no difference in age, sex, blood group, or social class. Disinfestation might produce a marked improvement in nutrition, and many worms meant low school grade. When only unfertilized ascaris eggs were present it was safe to conclude that males were absent, but with both kinds of eggs present there might not be excess of females over males. Unfertile eggs were more frequent in heavy than in light infections. Unfertilized eggs were present in 37–40 per cent. of all cases and were the only ones present in 20 per cent. Unisexual simple parasitism by the female occurred in 6·36, by the male in 3·34 per cent. of cases. Santonin was found to be twice as efficient an anthelmintic as decoction of *Digenea simplex* [the doses are unstated in the English summary] and removed all worms in 44 per cent. of cases. The bigger the worm, whether this was or was not the effect of sex, the easier was its expulsion. Ascaris, trichuris and enterobius were the commonest helminths, hookworms were most frequent in farm districts, paragonimus and *Hymenolepis diminuta* were rare. *C. L.*

PLATONOW (N. W.) & FROLOWA (W. T.). [**Incidence of Helminthic Infections among the Personnel of Public Dining Rooms in Novosibirsk.**]—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 1. pp. 28–31. [In Russian.]

The authors have examined 230 of the personnel of the public dining rooms in the town Novosibirsk for the presence of helminths. The method was to take from each person 2 slides of the perianal scrapings, 2 faecal smears and 4 slides of the film from a faecal suspension (after FÜLLEBORN). The parasites were found in the following percentages : Nematodes 32·6, *Enterobius vermicularis* 30·0, *Trichuris trichiura* 2·6, *Ascaris* 0, *Trichostrongylus* sp. 0. Cestodes 10·4 (*Taenia* 7·4, *Hymenolepis nana* 2·17, *Diphyllobothrium latum* 0·87). *Opisthorchis felineus* 0·44. The incidence of helminths according to occupation was as follows : charwomen 76 per cent., kitchen attendants 68, cooks 43, and dishwashers 41·26. *C. A. Hoare.*

PEREPÉREZ (Francisco) & PALAU. Contribución al estudio de las helmintiasis endémicas de la vega baja del Segura. San Fulgencio (Alicante). [**Helminthiasis in San Fulgencio (Alicante).**]—*Rev. Sanidad e Hig. Pública.* 1932. May. Vol. 7. No. 5. pp. 377–392. With 10 figs.

The number of persons examined in this investigation was not large, less than a thousand in town and rural irrigated areas together. In the former 582 were examined, 259 children and 313 adults, and 72 children (27·8 per cent.) and 37 adults (11·4) were positive. In the latter of 344 examined 69 were positive, 46 of 160 children and 23 of 184 adults ; altogether 178 positive out of 926. Of the different infestations the commonest was *H. nana* in 87 (9·3 per cent.) 75 children and 12 adults ; Oxyuris in 38 (4·1) next ; and then in order Strongyloides 27 (2·9), Trichuris 17 (1·8), Ankylostomes 8 (0·8) and Ascaris in 1 adult. The hookworm incidence was small and the results almost insignificant ; the authors do not consider that any campaign against it is justified.

H. H. S.

CHANDLER (Asa C.). **Susceptibility and Resistance to Helminthic Infections.**—*Jl. Parasitology.* 1932. Mar. Vol. 18. No. 3. pp. 135–152. With 1 chart in text. [41 refs.]

" . . . In helminthic infections the development of resistance to the effects of infection constitutes a problem quite distinct from development of resistance to continued reinfection. Resistance to injurious effects of infection is influenced by species and race of host, diet, age, intercurrent disease, and other factors which lower the reserve vitality of the host. Resistance to acquisition and continued accumulation of worms is influenced by species of host, age, diet, vitamin deficiency, and existing or pre-existing infection with the same species of worm. The development of acquired resistance is shown not only by failure of the hosts to acquire more parasites, but also by loss of parasites already established, by partial inhibition of reproduction, by retardation in rate of growth and decrease in size of worms, and in some cases by complete inhibition of development. Evidence is afforded that the immunity is at least in part local in nature, that blood changes play little if any part, and that the acquired resistance is highly specific in its nature." *C. L.*

YOSESATO (M.) & SUMI (I.). **Helminth Eggs on Vegetables in Mukden.**—*Jl. Oriental Med.* 1932. Apr. Vol. 16. No. 4. [In Japanese. English summary p. 51.]

Examinations of vegetables bought in public market and streets showed that helminth eggs (in the main ascaris with trichuris next) were found in vegetables in the following percentages, lettuce 92, spinach 54, radish 43, onion 33, cabbage 17, potato 8, and cucumber, tomato and egg plant 0. Presumably the ground was fertilized with human faeces. *C. L.*

WITENBERG (G.). **Fish as a Source of Worm Diseases in Man.**—*Harefuah.* Jerusalem. 1932. May-June. Vol. 6. No. 3. pp. 127–139. With 5 figs. [In Hebrew. English summary p. 4.]

After dealing with the biology of helminths transmissible by fish the summary suggests that the author's own contribution to knowledge is the following :

" A three minutes exposure to a temperature of 60° kills the metacercariae [of Heterophyes]. Thymol and fern extract proved to have anthelminthic properties against *Heterophyes. Dibothriocephalus latus* which is seldom found in Palestine, is brought into the country by immigrants and has apparently no suitable conditions for development here." *C. L.*

LAMSON (Paul D.) & WARD (Charlotte B.). **The Chemotherapy of Helminth Infestations.**—*Jl. Parasitology.* 1932. Mar. Vol. 18. No. 3. pp. 173–199. With 4 text figs. [89 refs.]

Having classed intestinal parasites according to their degree of attachment or penetration into the intestinal wall, their distribution in the intestine and their life history, the authors point out that *in vitro* tests valid for the human patient must be carried out either on human parasites or on closely allied ones, and that even then they will fail in " substances such as santonin which are active in the body." There follows a valuable classified list of about 300 chemicals which have been used as anthelmintics together with a reference for each " in order to orient one as to how it was used." More detailed consideration is given to thymol, betanaphthol, oil of chenopodium and ascaridole, carbon tetrachloride and tetrachlorethylene. " Carbon tetrachloride has probably been given in more cases of hookworm than any other drug, the treatments numbering several million. . . . There have been extremely few deaths in relation to the number of treatments. . . . Besides the avoidable danger of death from an overdose [of thymol or oil of chenopodium], cases with unexplained idiosyncracy to these substances are common, death having occurred after the administration of minute amounts. . . . Carbon tetrachloride differs from thymol and chenopodium in that we understand the cause of intoxication. We can prevent it by proper dietary measures and can counteract the early stages of intoxication by proper calcium therapy. . . . Dizziness, faintness, etc., similar to that seen after taking any volatile anaesthetic substance frequently occurs after its administration, but this should be clearly differentiated from intoxication." Yet, " those having treated large groups with thymol or chenopodium will all agree that many unpleasant symptoms occur, varying from dizziness, and faintness, to collapse and death ". [Not all. ASHFORD after two million treatments

with thymol and the reviewer after only some 60,000 have been unable to record fatality with 4 gm. doses.] For ascaris the authors divide anthelmintics into those producing fatal or temporary narcosis or paralysis of worms, those acting on the cuticle, those dissolving the parasite, and those acting in unknown ways. Hexylresorcinol acts on the cuticle of ascaris and is advocated as being non-toxic to man even after absorption and as having been given to thousands of patients for its action when excreted by the kidneys, and as being without known contraindications. There is, however, marked loss of anthelmintic power unless there is scrupulous abstention from food.

"We not only have some million or more chemical substances which may be considered possible therapeutic agents, to choose from, but these substances have been classified by the chemist and allow us to select closely related substances with beautiful gradations of properties. It remains for the pharmacologist to study the tissues of the body and attempt a pharmacological classification which will allow a better use of this enormous amount of material." *C. L.*

FÜLLEBORN. Immunität und Allergie bei Helminthenkrankheiten. [**Immunity and Allergy in Helminth Diseases.**]—Reprinted from *1er Congrès Internat. de Microbiologie, Paris, 1930.* 10 pp. [3 pages of refs.]

In this close written summary of his own work and that of others Fülleborn goes into the question of protection in man and animal against intestinal and other worms, and of the cutaneous reactions provoked by the injection of worm antigens and their practical worth. *C. L.*

BOUCHER (H.). Une infection multiple par les helminthes. [**Multiple Worm Infestation.**]—*Marseille-Méd.* 1932. Apr. 25. Vol. 69. No. 12. pp. 544–547.

The infections were with loa, hookworm, trichostrongyle and *Schistosoma mansoni*, in a traveller to South America and to Africa, whose habits were not those of sobriety personified. *C. L.*

GIRGES (Rameses). **Treatment of** *Schistosomiasis haematobium.*—*Jl. Trop. Med. & Hyg.* 1932. May 16. Vol. 35. No. 10. pp. 145–154. [10 refs.]

The paper deals with the clinical management of those cases in which something more is needed than exhibition of the sheet anchor, antimony. In cystitis for example Girges has had no benefit from bladder irrigation except in cases where it mechanically removes decomposed urine and débris. Renal colic may merely imply schistosomic ureteral swelling and needs immediate antimony treatment. The advantages of and contraindications for perineal cystotomy for bladder drainage are very fully discussed. Finally there is detailed consideration of the treatment of calculus, periurethral abscess, fistula, stricture, incontinence and acute retention of urine, malignant disease, cutaneous schistosomiasis, perineal tumours, hydronephrosis and gynaecological conditions. *C. L.*

MORRISON. Le traitement chirurgical des schistosomes (de la bilharzia haematobia). [**Surgical Treatment of Schistosomiasis.**]—*Rev. Prat. Malad. des Pays Chauds.* 1932. Jan. 11th Year. Vol. 12. No. 1. pp. 21–30.

The number of operations performed for schistosomiasis by Morrison from 1918–1920 was 1,314, namely perineal cystotomy 371, for urinary fistula 170, for removal of sessile or pedunculated rectal tumours 54, and simple laparotomies in cases of *S. mansoni* 971, the last having a surprisingly good effect. *C. L.*

SULLIVAN (S. J.). *Schistosoma haematobium:* **a Sporadic Case in Illinois.**—*Jl. Amer. Med. Assoc.* 1932. May 7. Vol. 98. No. 19. pp. 1642–1643.

A child of 4 who had never been more than 100 miles from Chicago developed a pertussis-like cough and strangury. "Examination [of the urine] showed macroscopic and microscopic blood, some yeast spores and a terminal spined yellowish egg. . . . Another specimen revealed 3 adult worms and many eggs."

"After considerable investigation to determine the source of the infection, an aquarium was found in which some tropical fish were kept, and among these were found snails that closely resembled descriptions of the intermediary host of the snail Bullinus. Examination of the water from the fish bowl showed fully developed cercariae, the stage of the parasite which infects man. This gives definite proof of the origin of the infection."

[In spite of all the assumptions made in this paper the case will no doubt burden the literature as a clear indigenous American one.]

C. L.

KHALIL (Mohamed) & HASSAN (Ali). **A Preliminary Note on a New Skin Reaction in Human Schistosomiasis.**—*Jl. Egyptian Med. Assoc.* 1932. Apr. Vol. 15. No. 4. pp. 129–130.

It is not the skin reaction but the antigen which is described as new, for the authors have used the adults of *S. bovis* as an antigen for the detection of schistomiasis by skin reaction. Details are to be published later, the information now given being that 42 persons known to be uninfected gave negative reactions, 10 cases "cured" a few months to 14 years earlier gave positive immediate ones, while of 136 cases passing ova all but 4 gave immediate, and only 2 gave delayed reactions. In 12, the immediate wheal was less than 10 mm. [not the usual 2·4 cm.] in diameter, and the 4 negative cases were undergoing treatment with fouadin. Extract of molluscan liver had proved unsatisfactory as an antigen "owing to the presence of the snail tissue itself which does not play any part in the production of immunity reactions." [Hamilton FAIRLEY, this *Bulletin*, Vol. 28, p. 196 and TALIAFERRO, HOFFMAN and COOK, Vol. 26, pp. 534, 535 reported that they had surmounted this difficulty in different ways.] *C. L.*

ARCHIBALD (R. G.) & MARSHALL (A.). **A Descriptive Study of the Cercaria of *S. haematobium* in the Sudan.**—*Jl. Trop. Med. & Hyg.* 1932. Aug. 1. Vol. 35. No. 15. pp. 225–228. With 1 coloured plate. [11 refs.]

The care taken to ensure the identity of the cercariae, a point not always sufficiently observed, was great. Clean laboratory-bred

Bullinus truncatus (which included *B. contortus*, *B. dybowskii*, and *B. innesi*) were infected from miracidia proceeding from Sudanese cases of urinary bilharziasis. The cercariae escaping from these molluscs are minutely described and their identity was further clinched by successful infection of two *C. sebaeus*. Quite definitely the authors satisfied themselves independently that this cercaria has only 3 pairs of penetration or secretory glands. Young *B. truncatus* were more readily infected than old, development to the cercaria stage needed at least 6 to 7 weeks, cercariae continued to be shed by snails for 75 days and *Physopsis africana*, *P. globosa*, *P. didieri*, *P. eximia*, *Planorbis alexandrinus*, *Cleopatra bulimoides*, *Melania tuberculata* and *Lanistes boltenianum* could not be infected. *C. L.*

GIRGES (Rameses). **The Aetiology of "Egyptian Splenomegaly."**—*Jl. Trop. Med. & Hyg.* 1932. Mar. 15 & Apr. 1. Vol. 35. Nos. 6 & 7. pp. 86–90; 99–105. With 1 graph. [37 refs.]

The conclusions reached in this closely reasoned paper, which concerns itself with a mass of literature as well as the author's own observations, are indicated in the opening paragraph.

"Egyptian splenomegaly is a disabling endemic parasitic syndrome caused by male *Schistosoma mansoni* infestation of the liver and portal vein. It is widespread amongst the rural population in all parts of Lower Egypt, particularly in localities situated by the end-canals and at the termination of big irrigation canals, where schistosomiasis mansoni is rife. It affects 2 per cent. of my patients. It may be compared in its different stages with Katayama disease, which is the visceral type of schistosomiasis japonicum and closely resembles Banti's disease. It presents an absolutely different picture from the ordinary type of schistosomiasis mansoni. There is very little or no alimentary disturbance or implication of the gut, the brunt of the infection being inflicted upon the viscera. Thus, besides the febrile symptoms, anaemia and other blood changes, there is at first a definite hepatic enlargement and an increasing hypertrophy of the spleen and abdominal lymphatic glands, and later on there occur hepatic cirrhosis, marked splenomegaly and ascites." *C. L.*

TAYLOR (A. W.). **An Inquiry into the Origin of an Outbreak of Schistosomiasis among Europeans at Kagoro, Northern Nigeria.**—*West African Med. Jl.* 1932. Apr. Vol. 5. No. 4. pp. 61–62.

Four, perhaps 5, cases of infection with *S. mansoni* occurred among Europeans who had bathed in an attractive rocky pool, entirely without vegetation, situated at the bottom of a 15 foot waterfall. It was found however, that above the falls were several small ponds connected by trickles of water with the bathing pool below and containing *Planorbis pfeifferi* and *P. stanleki*, which were not separately identified at first, and that of 280 dissected in November and December of two years the numbers infected with fork-tailed cercariae were 8. Of 82 dissected in April and June none were infected. A village lay 50 yards from the pools and the path to the river bank passed between them. The cercariae were morphologically indistinguishable from those of *S. mansoni*, but experimental infections could not be applied. *C. L.*

JONES (S. B.). **Intestinal Bilharziasis in St. Kitts, B.W.I.**—*Jl. Trop. Med. & Hyg.* 1932. May 2. Vol. 35. No. 9. pp. 129–136. With 14 text figs. (1 map).

St. Kitts is one of the Leeward Islands and it was in a man from this group that Sir Patrick MANSON first found lateral spined ova. It is

conservatively estimated that a quarter of the population is infected with *S. mansoni* and held that the human infection could be completely eradicated in 3 months leaving that in the wild African green monkey, discovered by CAMERON, to be dealt with. Clinically, the disease is classed as febrile and urticarial, gastro-intestinal, and hepatico-splenic. Tartar emetic has been the drug used in nearly all the 200 cases treated during the last 7 years, they being indigenously acquired with few exceptions. After looking vainly for infected snails for 13 years JONES, in November 1931, found some planorbids emitting bifid cercariae in a tank fed by a stream in an endemic area. Microscopic faecal examination, presumably by smear, of 45 boys showed the following percentages of infection: Total 97·7, ascaris 91·1, trichuris 20, strongyloides 2·2, *S. mansoni* 22·2. *C. L.*

VOGEL (Hans.) Hauterscheinungen bei Schistosomiasis. Beobachtungen ueber Zerkarien-Dermatitis, Kutanreaktionen und ein Vulva-Granulom. [**Skin Phenomena in Schistosomiasis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. July. Vol. 36. No. 7. pp. 384–399. With 10 text figs. [19 refs.]

Having considered recent literature, Vogel describes the papule which formed 6–8 hours after the entrance of *S. mansoni* into the skin of a white person. In two negroes who washed in water containing these cercariae there was merely pruritus. Excision of skin into which cercariae had bored 2½ hours earlier showed their tracks, and the cercariae in the lower layers of the epidermis with a surrounding neutrophil and eosinophil reaction. Among 50 Africans the dried powdered mid-intestinal gland of *Planorbis pfeifferi* infected with *S. mansoni* rubbed into vaccination scratches produced a dark rash in 22 cases of schistosomiasis, 18 being definitely positive and 4 doubtfully so; while among 28 who showed no eggs, there was no reaction in 14, a doubtful one in 8 and a positive one in 6, but 3 of these last showed red and white corpuscles in the urine, and in all 6 one examination only was made. The histology of a bilharzial granuloma of the vulva is described. It contained paired schistosomes and many eggs, and these eggs were able to escape through the epidermis. *C. L.*

GOTO (Takeo). Beiträge zur Kenntnis der Migrations-route von Schistosoma japonicum in den Endwirten. [**The Migration Route of *S. japonicum* in the Final Host.**]—*Fukuoka-Ikwadaigaku-Zasshi* (*Fukuoka Acta Med.*). 1932. Mar. Vol. 25. No. 3. [In Japanese. German summary pp. 11–13.]

Goto has set himself to discover whether MIYAGAWA and TAKEMOTO FAUST and MELENEY, and IJIMA are right in concluding that after reaching the lungs cercariae arrive at the liver through the circulation, or whether NARABAYASHI and SUYEYASU should be followed in the conclusion that the route between the two viscera is directly through mediastinum, pleura and diaphragm. He finds that the washing out of the organs and tissues of dogs indicates the former route, while serial sections of the bodies of decalcified mice indicates the latter. He concludes that you can get what result you like by the choice of the method you use; but he takes no account of the established influence of an abnormal host in leading larval worms astray. *C. L.*

Abbatucci (S.). La prophylaxie de la bilharziose. [**Prevention of Schistosomiasis.**]—*Ann. d'Hyg. Pub. Indust. et Sociale.* 1932. May. Vol. 10. No. 5. pp. 267–272.

The life history of the parasites is described, as is prevention by treatment and by protection of water. The tendency of the infection, it is believed, is to become world wide. *C. L.*

MacHattie (C.) & Chadwick (C. R.). *Schistosoma bovis* **and** *S. mattheei* **in Irak with Notes on the Development of Eggs of the** *S. haematobium* **Pattern.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 147–156. With 2 plates. [16 refs.]

" 1.—*Schistosoma bovis* is described from Irak.

" 2.—Horses, donkeys and mules have been found to be definitive hosts for *S. bovis*.

" 3.—The eggs of *S. bovis* in Irak are never or only very rarely passed in the urine and the pelvic and urinary structures are not pathologically involved in the infection which is essentially portal and intestinal.

" 4.—A survey of the literature shows that the generally accepted characters of naturally occurring *S. bovis* have been based on scanty material or on specimens collected from one locality only. It has been the writers' good fortune to have at their disposal a vast number of specimens collected from several natural hosts in various widely separated outbreaks, and they conclude that the existing standard of *S. bovis* as described by Khalil (1924) should be modified as follows :—

" (*a*) Length 12 mm. to 28 mm.

" (*b*) The measurements of the egg *in utero* 90 to 205μ by 38 to 62μ. The measurements of the egg in the gut wall 130 to 260μ by 40 to 95μ.

" (*c*) Only rare specimens show the vitellaria confined to the posterior fourth of the female. In the vast majority of females the vitellaria occupy a little less than half the total length of the body.

" (*d*) The shape of the egg is usually that described by Khalil but approximately 0·1 per cent. of females show somewhat oval shaped eggs.

" (*e*) About 1 per cent. of females show many typically shaped *S. bovis* eggs *in utero* and in the same uterus one or more typically shaped *S. haematobium* eggs having the same measurements as the egg of this parasite of the human subject.

" (*f*) Approximately 0·2 per cent. of females contain solely eggs of *S. haematobium* shape and measurement. Such females are only distinguishable from this parasite of man in that the vitellaria occupy approximately one-half of the total length of the female.

" 5.—*S. mattheei* as described by Veglia and Le Roux (1929) is indistinguishable from *S. bovis* as the latter occurs in Irak.

" 6.—Even in an area of intensive urinary schistosomiasis of man, the occurrence in cattle and sheep of eggs indistinguishable from those of *S. haematobium* does not justify the incrimination of these domestic animals as reservoirs of human infection." *C. L.*

Kouri (Pedro) & Arenas (Rogelio). La distomatosis hepatica en Cuba. [**Liver Fluke Infestation in Cuba.**]—1932. May. Vol. 1. 176 pp. With 30 figs. Habana.

This is a collection of three papers published in *Vida Nueva* of October and November, 1931 and March, 1932. The first two were dedicated to the memory of Drs. Lebredo and Agramonte. The first describes in full detail two cases of human infestation by *Fasciola hepatica* and in the introduction mention is made of 5 others, all 7 being

met with between July, 1931, and the following March. In addition 3 cases of clonorchiasis in Chinese were encountered. The illustrations in this article are good, both of the Fasciola itself and of the morbid conditions to which it gives rise, but no new matters are brought forward.

The second and third articles refer especially to treatment and the latter to the good effects obtained in the authors' patients by means of emetine hydrochloride. In fact, they regard this drug, injected in doses of 3 cgm. daily for 17–18 days, as a specific, the course of treatment being controlled by use of the duodenal sound. The third paper is reproduced also in French. *H. H. S.*

Kouri (Pedro) & Arenas (Rogelio). **Actual Conditions of the Hepatical Dystomatosis** [*sic*] **in Cuba. Its Treatment. Previous Statements about its Prophylaxis.**—*Vida Nueva.* 1932. May 15. Vol. 29. No. 5. pp. 464–468. [Spanish version pp. 458–463 and French pp. 469–474.]

Within a year 8 cases of infection with *Fasciola hepatica* and 4 of *Clonorchis sinensis* have been discovered in Cuba. For the former infection emetine is held entirely specific, non-surgical drainage of the biliary tract disclosing degenerate eggs while later none are found. The dosage of emetine in cattle is being investigated. *C. L.*

Sievers (H. K.) & Oyarzun (R.). Diagnostic de la distomatose hépatique par la réaction allergique. [**Diagnosis of Hepatic Distomiasis by an Allergic Reaction.**]—*C. R. Soc. Biol.* 1932. June 27. Vol. 110. No. 22. pp. 630–632.

Using as antigen washed, dried, and powdered *Fasciola hepatica* [it was apparently immaterial whether the flukes were or were not first soaked in alcohol or in ether for 24 hours] there was a positive reaction to the scratch test in 61 sheep which after death showed these flukes and none in 39 which did not. The intradermal reaction in 35 sheep was equally definite. The reactions were of the immediate type. *C. L.*

Tubangui (Marcos A.). **Observations on the Life Histories of** *Euparyphium murinum* **Tubangui, 1931, and** *Echinostoma revolutum* **(Froelich, 1802), (Trematoda).**—*Philippine Jl. Sci.* 1932. Apr. Vol. 47. No. 4. pp. 497–513. With 3 plates. [12 refs.]

" Snails (*Lymnaea peregra* Müller) obtained from an irrigation canal in Trinidad Valley, near Baguio, Mountain Province, Luzon, were found infested with two kinds of echinostome larvae (trematodes) distinguishable from each other only by the number of spines on the head collars of the cercariae and metacercariae.

" Encysted metacercariae possessing thirty-seven cephalic spines, when fed to experimental animals, developed into adult worms in young house pigeons after twelve to fifteen days; they failed to infect rats and a monkey. The adult parasites have been identified as *Echinostoma revolutum* (Froelich, 1802).

" Encysted metacercariae with forty-five cephalic spines, when fed to experimental animals, developed into full-grown adults in white laboratory rats after ten to fifteen days; they failed to develop in young pigeons and in a monkey. The adult worms have been identified as *Euparyphium murinum* Tubangui, 1931."

[*E. revolutum* has been reported as a parasite of man in Formosa (this *Bulletin*, Vol. 27, p. 453).] *C. L.*

KATSUTA (I.). **Studies on Trematodes whose Second Intermediate Hosts are Fishes from the Brackish Waters of Formosa (4th Report). On a New Trematode " Monorchotrema yokogawai " of which the Mullet is the Second Intermediate Host.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1932. Mar. Vol. 31. No. 3 (324). [In Japanese. With 8 figs. on 1 plate. English summary pp. 25–26.]

Monorchotrema yokogawai n. sp., with cat and dog as optimum hosts, has been experimentally transferred to man. Its description is given with illustrations. The eggs closely resemble those of *Metagonimus yokogawai* and other Heterophyidae, and measure 0·0317 by 0·0156 mm.

C. L.

ASSATOUROW (A. G.). [**Four Cases of Liver Dicrocoeliasis in Man.**]—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 1. pp. 38–39. [In Russian.]

During 1928–29 the author observed eighteen human cases of *Dicrocoelium lanceatum* infection in the Caucasus. In fourteen, the ova were recovered from the faeces only; while in four the diagnosis was confirmed by finding the ova in the duodenal aspirates.

C. A. Hoare.

WITENBERG (G.). **On the Anatomy and Systematic Position of the Causative Agent of So-called Salmon Poisoning.**—*Jl. Parasitology.* 1932. June. Vol. 18. No. 4. pp. 258–263. With 1 fig. [15 refs.]

In Witenberg's view *Nanophyetus schikhobalowi* Skrjabin and Podjapolskaja, 1931 obtained from the aborigines of East Siberia is synonymous with *N. salmincola* Chapin, 1926. *C. L.*

BACIGALUPO (Juan). Algunas consideraciones sobre teniasis por *Hymenolepis nana.* [**Infestation by** *Hymenolepis nana.*]—*Arch. Argentinos Enferm. Aparato Digest. y Nutric.* 1932. Feb.-Mar. Vol. 7. No. 3. pp. 359–364.

The author quotes previous records to show that infestation by *H. nana* is fairly common in children in the Argentine and by no means rare in adults. Thus, LYNCH (1904) found the ova in 8·2 per cent. of 137 faeces of children, PARODI and WIDACOVICH in 8 per cent. of 150, the author himself found them in 10 out of 142 in 1924, and 6 of 72 in 1927, *i.e.*, 7·4 and 8·3 per cent. respectively. As regards adults CASTEX and GREENWAY found 5 positive of 614 (1925), and 0·7 per cent. of 2,023 (in 1926), and the author 6 out of 448 adults (1·3 per cent.) at the Military Hospital.

He gives more detailed accounts of three adults at the Military Hospital. They suffered from colic, nausea, nervousness and a constant feeling of fatigue, and in one case from epileptiform convulsions which had lasted for 5 years and disappeared after 4 gm. of ethereal extract of male fern and a saline purge. This treatment produced

7,360, 2,000 and "about 1,000" worms in the 3 cases respectively. The property of *H. nana* to undergo evolution by direct and indirect cycles the author designates diheteromonoxenia. *H. H. S.*

TSUCHIYA (H.) & ROHLFING (E. H.). *Hymenolepis nana*: **Report of Additional Cases and an Experimental Transmission from Man to Rats.**—*Amer. Jl. Dis. Children.* 1932. Apr. Vol. 43. No. 4. pp. 865–872. [23 refs.]

Three cases of *H. nana* infection were discovered during routine faecal examinations of 362 children in St. Louis for protozoal infections. In two, who could be examined further, no evidence of damage by the infection was discovered. Onchospheres were obtained from human faeces by alternate washing and sedimenting and fed to 6 rats who had been carefully examined and protected against infection. Two of them began passing onchospheres about 6 weeks later, and 6 and 10 strobiles were recovered on killing them. The others showed no sign of infection during 68 days of observation. The results of SAEKI in 1920 and UCHIMURA in 1922 in producing infection from rat to man are mentioned. *C. L.*

KELLAWAY (Charles H.) & FAIRLEY (Keith D.). **The Clinical Significance of Laboratory Tests in the Diagnosis of Hydatid Disease.**—*Med. Jl. Australia.* 1932. Mar. 5. 19th Year. Vol. 1. No. 10. pp. 340–342. With 3 text figs.

With the intelligent application of 4 laboratory tests the correct diagnosis of hydatid infection will, it is held, be made in at least 90 per cent. of cases. The first test is the presence of laminated membrane, often described by the patient in sputum or urine as grape skins, of scolices or of hooklets, all illustrated; diagnostic puncture is discouraged for fear of anaphylaxis, secondary echinococcosis, or, in lung infection, rupture into bronchi. Eosinophilia to 300 per cmm. is found before operation in about half the cases. The intradermal reaction with pooled, sterile, active hydatid fluid is immediately positive in at least 95 per cent. of infections before a first operation; it is of no diagnostic value later; it is held positive when the wheal, with outrunners, measures at least 2·4 cm. in one diameter, or 2·2 cm. in two diameters; a delayed reaction to a first test is found before operation in half the infections. The complement fixation test is positive in from 50 to 60 per cent. of infections tested before any operation; and almost invariably so if a cyst has ruptured or suppurated within the previous month, though if within 2 months the positive reaction may have gone. *C. L.*

MORENAS (L.). Utilisation du liquide de cysticerque (*Cysticercus tenuicollis*) comme antigène dans la réaction de Casoni. [**Use of Cysticercus Fluid as Antigen in Casoni's Reaction.**]—*C. R. Soc. Biol.* 1932. June 3. Vol. 110. No. 19. pp. 321–322.

In two cases, in which there had been operation for hydatid cysts, intradermal reactions, presumably delayed, were obtained with fluid obtained from *C. tenuicolis* of sheep as positively as with hydatid fluid; and locally the former is far more readily obtained than the latter.

C. L.

MILLER (Harry M.), Jr. & GARDINER (Margaret L.). **Protection of the Rat against Infection with a Larval Tapeworm by Serum from Immune Rats.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Mar. Vol. 29. No. 6. pp. 779–780.

Three groups each consisting of 12 rats were given by stomach tube equal quantities of a uniform suspension of onchospheres. One group (C) was a control. Two hours after the infective feed the other two groups were injected intraperitoneally with 1 cc. of serum for every 25 gm. of body weight. In group B. this serum was from artificially immunized rats, in group A from infected rats. The results were as follows :—

Group.	Living onchospheres 2–6 mm. in diameter.	Small dead onchospheres.
A	0	0
B	0·5	6·0
C	22·2	18·7

In another experiment analogous results were obtained. " Complete protection has now been secured by the injection of serum from rats infected with cysticerci." *C. L.*

i. MILLER (Harry M.), Jr. **Transmission to Offspring of Immunity against Infection with a Metazoan (Cestode) Parasite.**—*Proc. Soc. Experim. Biol. & Med.* 1932. June. Vol. 29. No. 9. p. 1124.

ii. ——. **Acquired Immunity against a Metazoan Parasite by Use of Non-Specific Worm Materials.**—*Ibid.* pp. 1125–1126.

i. A degree of protection, lasting about 6 weeks, was transmitted to the offspring of female rats which had been actively immunized against *Taenia taeniaeformis* or infected with its larval stage.

ii. Introduction into the peritoneal cavity of rats of whole, or long pieces of, living *Taenia pisiformis* resulted in a high degree of protection against infection by the larvae of *T. taeniaeformis*. *C. L.*

WARDLE (Robert A.). **On the Technique of Cestode Study.**—*Parasitology.* 1932. June. Vol. 24. No. 2. pp. 241–252. With 2 figs. [13 refs.]

For collection of cestodes from mammals the advice given is to ligature at the pylorus and ilio-caecal valve and, by snipping the mesentery, to straighten the small intestine on a black board on which a 12 inch scale is marked. Lengths of 12 inches are opened, obvious helminths removed to decimolar (decinormal) NaCl, the section detached, and its contents squeezed with a camel's hair mop into the same solution. The process is repeated foot by foot. If flooding with the saline does not detach cestodes the bit of intestine to which they are attached should be cut out and removed with them. Cestodes are at once taken from the saline to a glass plate. The scolex is held by a brush soaked in hot water at 60°C. and with another brush the strobile is stroked downwards with the same hot solution and then transferred to a 10 per cent. solution of saline-formalin. [The legend to Fig. 1 describes the

process, however, as "painting with hot 10 per cent. formalin."] Staining and methods of reconstruction by wax, celluloid or gelatine are described. *C. L.*

WITENBERG (G.). **On the Cestode Subfamily Dipylidiinae Stiles.**—*Ztschr. f. Parasitenk.* 1932. May 18. Vol. 4. No. 3. pp. 542–584. With 45 text figs. [2 pages of refs.]

"A new definition of the subfamily *Dipylidiinae* is given. It comprises the genera: *Dipylidium, Joyeuxia* and *Diplopylidium*, while other genera which until recently were included in this subfamily are separated to form a new subfamily *Monopylidiinae*. A redescription of seven well established species out of 34 known is given, on the basis of type material and specimens collected in Palestine.

". . . Remarks on individual variations and life history . . . are given and the synonymy is elucidated." *C. L.*

JOYEUX (Ch.), HOUDEMER (E.) & BAER (J. G.). Etiologie de la sparganose oculaire. [**Etiology of Ocular Sparganosis.**]—*Marseille-Méd.* 1932. Mar. 25. Vol. 69. No. 9. pp. 405–409.

The paper considers the mechanism of production of this infection, the identity of *S. mansoni* and of the worm causing ocular infection and notes that the report is preliminary. *C. L.*

LANCET. 1932. May 28. pp. 1167–1169. [15 refs.]—**Antigen-based Tests in the Diagnosis of Nematode Infections.**

Although all the papers considered in this article have been abstracted in this *Bulletin*, their collection into a critical note should be valuable. After dealing with the possibility of obtaining a pure antigen in cases where the worm lies imbedded in tissue three antigen-based tests are considered. Precipitin reactions while present constantly in trichinosed animals only develop after an interval so considerable that by that time human cases are dead or convalescent: while intestinal infections show no parallelism between a positive reaction and the presence of the parasite. In considering intradermal reactions there occurs the sentence "These findings suggest that antigen-based tests" immediate or delayed "for nematodes will mainly prove effective in those infections in which the parasite lives in plasma or lymph." Complement fixation tests, apart from those applied with negative results by FAIRLEY and Glen LISTON in 1924 to Dracunculus infections, do not seem to have been applied to lymph-dwelling nematodes until FAIRLEY did so to Loa and *W. bancrofti* infections (this *Bulletin*, Vol. 28, p. 679) and it is believed that in face of these antigen-based tests and of the "anatomical studies which are being made by O'Connor the prospects of further and early additions to knowledge of filariasis seem more promising than has for long been the case." *C. L.*

OTTO (G. F.). **Ascaris and Trichuris in Southern United States.**—*Jl. Parasitology.* 1932. Mar. Vol. 18. No. 3. pp. 200–208. [16 refs.]

Certain figures concerning ascaris infection are brought together in the table reproduced overleaf.

TABLE I.—Comparison of Ascaris and Trichuris Infestations in Tampa, Florida, and Louisiana (Rural) with that in Panama and in the Mountains of Southeastern United States. Males and Females, 0–14 Years Old.

	Total number examined	Ascaris		Trichuris	
		Per cent. positive.	Average egg count per gram feces	Per cent. positive	Average egg count per gram feces
1. Panama*	1,119	57·9	27,970	60·0	1,640
2. Virginia (Mts.)†	1,573	56·1	13,730	29·1	435
3. East Tennessee (Mts.)	13,191	36·7	5,960	11·8	149
4. Tampa, Florida—					
(*a*) Latin Americans	105	41·9	10,900	40·0	980
(*b*) Native Americans	98	26·5	5,770	18·4	270
(*c*) Negroes	145	39·3	8,800	17·9	220
5. Louisiana	2,474	24·9	8,210	39·7	1,410

* Compiled from tables given by Cort, Stoll, Riley and Sweet, 1929.
† Compiled from tables given by Cort, Otto, and Spindler, 1930.

It is repeatedly noted that ascaris infection can frequently be correlated with pollution in the yards of houses. For instance in Tampa, although "native-Americans" have sewered houses with modern bathrooms, these seem to be little used while the small house yards are polluted. Again in Louisiana the presence of privies does not mean absence of pollution in the yard, and it is stated that ascaris infection is nearly equal to that found in the mountains and trichuris infection is much greater. Suggested causes of this excess of trichuris infection are, a greater susceptibility of ascaris eggs to violet rays, and a shorter life for ascaris, so that from originally mixed infections only trichuris survives. The rapid reinfection which follows ascaris disinfestation in heavily infected parts is held to make reliance on treatment useless as a means of lowering general infection. "However, the sanitary privy or in fact most any type of privy no matter how obnoxious if used by all members of the family will effectively control infestations with these parasites." [No doubt the evidence for this statement will be made public.] The slow progress which must be expected in educating people to the use of sanitary measures and appliances is stressed; it is not expected to be effective for generations.

C. L.

NOLF (L. O.). **Experimental Studies on Certain Factors influencing the Development and Viability of the Ova of the Human Trichuris as compared with those of the Human Ascaris.**—*Amer. Jl. Hyg.* 1932. July. Vol. 16. No. 1. pp. 288–322. With 8 figs. [27 refs.]

"Studies were made on factors affecting the development of the ova of human trichuris and ascaris which showed certain adaptations for survival

and development as well as some of their limitations. The respiratory gases produced in the development of the trichuris ova were measured by the Van Slyke method of gas analysis which showed that the R.Q. of ova, developed from the single cell to embryonation, was 0·86, and that there was no exchange of nitrogen during this period of development. The calculated quantity of oxygen used by a trichuris ovum in becoming embryonated, 0·000002719 cc., is not materially different from that used by an ascaris ovum.

" The experiments in which the ova were exposed to high temperatures showed that trichuris ova were killed at slightly lower temperatures than were the ascaris ova, heating to 52° to 54°C. for a short time being lethal. Exposure of the ova and partly developed embryos to freezing temperatures (–9 to –12°C.) resulted in a high percentage of fatality in the trichuris but had no apparent effect on the ascaris.

" The percentage of development in chambers of various relative humidities confirmed the finding by Spindler that trichuris ova required a more highly saturated atmosphere before they could develop than did ascaris ova and that the former were less resistant to desiccation.

" Ova were exposed to ultra-violet light from two sources, one having a wavelength from 280 to 315 mμ and the other from 180 to 315 mμ. Light from either source was highly fatal to the ascaris ova, there being no difference in effects that correlated with the difference in quality when given the same Clark units exposure. The trichuris ova were much more resistant to the effects of the light." *C. L.*

Fülleborn (Friedrich). Klinisches und Biologisches ueber *Ascaris lumbricoides*. [*A. lumbricoides*, **Clinical and Biological.**]—Reprinted from *Internat. Ärztlicher Fortbildungskursus*. 1931. Vol. 13. 38 pp. With 4 text figs. [5 pages of refs.]

X-rays in Laurell's hands showed that the normal site of the ascaris is in the jejunum and that in infections with hundreds they lie stretched motionless side by side with room between for the chyme to pass, but if numbers pass downwards they may knot themselves into obstructing masses. Their wandering and their perforation of the gut are described, and their feeding, their toxins and the anaphylactic changes they may produce considered, a matter which leads on to the clinical symptoms, which may, however, be absent. The concentrative method illustrated under diagnosis is that of looping the surface, introduced by Kofoid and Barber, and the convex preparation is examined under a low power without a cover. Eosinophilia and skin reactions are dealt with. For treatment oil of chenopodium is advised as more active than santonin, harmless for children and usable in smaller dose than it is against hookworms. Epidemiology and prevention are dealt with, and attention drawn to the post-war increase of this infection in Germany, the result of insanitary trenches. Lastly the wandering of the intracorporeal larval stages is dealt with from its discovery by Stewart onwards. *C. L.*

Otto (G. F.). **The Appearance and Significance of the Unfertilized Eggs of** *Ascaris lumbricoides* **(Linn).**—*Jl. Parasitology*. 1932. June. Vol. 18. No. 4. pp. 269–273. With 1 plate.

Since Otto holds that laboratory technicians even now do not usually recognize unfertile ascaris eggs, first described by Miura and Nishiuchi in 1902, and since the triangular type seems never to have been figured, he describes and figures the various types which may be found, as viewed in decinormal caustic soda ; pointing out the ease

with which this solution dissolves the outer albuminous coat and thus alters the egg's appearance. Unfertilized eggs occurred to the extent of 15·9 per cent. of 51,329. Of faecal slides containing ascaris eggs, unfertile eggs were found in 68 per cent. and fertile eggs in 74 per cent., that is to say, unfertile eggs alone were found in 26 per cent. of slides. Single females may produce either or both forms. *C. L.*

Muir (J. B. G.). **Removal of an Ascaris from the Common Bile Duct.**—*Brit. Med. Jl.* 1932. June 11. pp. 1077–1078. With 1 plate. [10 refs.]

This report from Tientsin, N. China, concerns a coolie of 35 suffering with most acute epigastric pain, rigidity and distension, vomiting, slight icterus, pulse 100, temperature 97°, leucocytes 21,000, polymorphs 85 per cent. Operation disclosed an ascaris, evidently a female, in duodenum, common bile duct, cystic duct and gall bladder. Muir's personal experience includes two ascaris-containing appendices and one posterior no-loop gastroenterostomy, and fistulae from abdominal gunshot wounds extruding ascarids. Stress is laid on the need in ascaris-infected countries to remove ascarids before operation. *C. L.*

Purcell (Frederick M.). **Acute Colitis due to *Ascaris lumbricoides* simulating Dysentery.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. p. 199.

In a child of 18 months the stool was dysenteric, the microscope showed mucus and blood cells with no amoebic cysts or macrophages but with some ascaris eggs. One drachm [4 gm.] of castor oil and one minim of oil of chenopodium, repeated once brought away a knot of 12 worms and all symptoms ceased. Ascaris infects nearly everyone at Keta, Gold Coast.

C. L.

Kurisu (Sotaro). **An Experimental Investigation on the Effect of Vitamin Deficiency upon the Infection and Development of *Ascaris lumbricoides*.**—*Sei-I-Kwai Med. Jl.* 1931. Oct. Vol. 50. No. 10 (548). [In Japanese. English summary pp. 7–8.]

Experiments on rats and pigs led to the conclusion that a diet deficient in vitamin A predisposes to infection with ascaris. *C. L.*

Ishii (Y.) & Yamashiro (R.). **Experimental Studies on the Appearance of Ascaris-Larvae in the Urine.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1932. Mar. Vol. 31. No. 3 (324). [In Japanese. English summary p. 27.]

It is intensity of infection which determines the appearance or otherwise of ascaris larvae in the urine of rabbits. If 200,000 to 300,000 larvae are given some almost always can be found in this ; if fewer than 100,000 they rarely appear. *C. L.*

Stiles (Ch. Wardell). **Hookworm Disease in White School Children: Comparison of Two Methods of Survey.**—*Jl. Amer. Med. Assoc.* 1932. June 18. Vol. 98. No. 25. pp. 2189–2190.

" It is rather generally acknowledged that a microscopic examination should precede treatment in all cases of hookworm disease. This view is based on sound experience and sound theory. The microscopic examination is especially important if carbon tetrachloride is to be used in treatment, for if the case is complicated with Ascaris infection, the clinician should know this fact before treatment is instituted."

As regards symptomatic diagnosis Stiles's position is that any person with real experience of the clinical aspect of this infection is thoroughly justified after a brief inspection of white children—a "street car diagnosis"—in arriving at conclusions as to whether hookworm disease is playing any material role among the children. He has had his own conclusions checked by microscopic examination [the technique is unstated] with the results shown in the table.

TABLE 1.—Comparative Results obtained by Two Methods.

Symptomatic Survey Method.

School number	Number of children seen	Hookworm suspects*		
		Number	Per cent. uncorrected	Per cent. corrected.‡
11	474	228	48	38
12	345	132	38	30
13	478	366	77	62
14	73	70	96	77
15a	79	78	99	79
15b	—	—	—	—
Total 5 schools ...	1,449	874	60	40

Microscopic method

School number	Number of children examined	Hookworm positives†	
		Number	Per cent.
11	—	—	—
12	—	—	—
13	—	—	—
14	37	36	97
15a	87§	78	90
15b	42	28	67
Total 3 schools	166	142	86

* Includes all gradations from very severe cases, such as dirt eaters, to doubtful suspects.

† Includes all hookworm infections from severe infestations to exceedingly light infections, such as carriers.

‡ Deduction of 20 per cent. for average theoretical error.

§ Seven of these were of preschool age and were not seen in the original clinical survey.

Moreover, among 199 children from schools in 2 States the number of positive hookworm infections recognized by the microscope was 158, of ascaris 53, of enterobius 11. Of the children 84 per cent. were infected with one or more species of worms. He concludes :—

"For all practical purposes, in judging whether this infection is of educational and administrative importance to the school, the conclusion

reached is as sound and valuable (perhaps more so) as (than) the conclusion based on the microscopic observations, for the latter considers only the worms, while the former considers the effect of the worms on the children."

C. L.

STILES (Ch. Wardell). **Some Practical Considerations in Regard to Control of Hookworm Disease in the United States under Present Conditions.**—*Jl. Parasitology.* 1932. Mar. Vol. 18. No. 3. pp. 169–172.

Stiles continues his self-imposed campaign to convince Americans that when Mr. Rockefeller, having started hookworm work in the United States, ceased to do so it was not because he considered the hookworm problem solved but because he held it to be the duty of local authorities to see the work through. Stiles repeats the reasons for using the schools as re-energizing points for the new campaign [*ante*, p. 418]. He goes on:—

"Will the teachers do the work? My answer is: Yes, up to at least 90 per cent. efficiency. I speak from years of practical field experience with these enthusiastic, dependable, loyal public servants.

"The foregoing plan will reduce suffering, increase efficiency and educational results, and make the school funds go further. But of itself it will not eradicate hookworm disease. The final problem is to change the daily habits of hundreds of thousands of whites, Indians, and negroes (who are living under a system of 'dog sanitation') to the Mosaic system of 'cat sanitation.' This will take at least three generations longer of educational health work. Civilisation was not made in a day." *C. L.*

ARNAUD (R.). Rapport de mission sur l'ankylostomiase dans le secteur du laboratoire de Leopoldville. [**Ankylostomiasis in the Leopoldville Laboratory Sector.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Mar. 31. Vol. 12. No. 1. pp. 5–34. With 10 figs.

An uncritical abstract of this paper would be valueless to those in ordinary tropical practice. Stool examinations were made by a modification of one of Stoll's techniques but this was after a time further modified by the substitution for a decinormal caustic solution of one containing either 1·4 NaCl and 2·25 sodium hypobromite per cent. or 1 gm. KBr in a 30 per cent. solution of the hypo. This is stated, pontifically, that is without evidence offered, to give a more even suspension and to break up the stool, and so release eggs more satisfactorily than the methods of either Stoll or the Caldwells; so that it is of interest to note that the estimates given in the paper for the number of eggs passed daily by a female hookworm were from 2,630 to 2,900 and that it is stated "Ce nombre est légèrement inférieur à celui de Stoll." In point of fact it is a third to a quarter of Stoll's figure for formed stools. The discovery that there exists some relationship between egg counts and worm numbers is attributed to Looss, and with the present general tendency to believe that this is a yet more modern development it is well to say in criticism that while Looss was indeed led, in 1897, by his knowledge of this general relationship to his discovery of the cutaneous route of infection by hookworms, he was in fact deliberately using knowledge acquired by LUTZ and by LEICHENSTERN in 1885, and apparently by PARONA still earlier.

By the diagnostic methods just indicated ankylostome infection was detected in 71·7 per cent. of 2,653 stools and it should be noted that

the reader must not be guided by Schema No. 1 in which [illegible] the column representing total [illegible] longer than that representing O.C.F. Of 251 worms recovered 92·8 per cent. were necators and 7·2 per cent. ancylostomes. Occult blood in faeces was tested for by [illegible] acetic acid and hydrogen peroxide in rectified spirit. It was never found when eggs were fewer than 800 [per gm.], was nearly always present when they were over 3,000, and might or might not be detected when numbers were intermediate, and it is concluded that nearly all the infected are healthy carriers. The alternative, of course, is that just as present liver function tests do not reveal the extent of liver damage caused by carbon tetrachloride [this *Bulletin*, Vol. 24, p. 235], so these tests of faeces do not reveal the extent of bleeding which has occurred high in the intestine. And WELLS's direct observation that a single *A. caninum* wastes blood at the rate of 0·84 cc. daily [*ibid.*, p. 421] suggests that for hookworms in man this explanation probably holds. In 6 districts tested, haemoglobin lay between 61 and 67 and the average amount was greater in those who possessed hookworms than in those who did not. This is due to the fact that infants under a year old and not hookworm infected showed a haemoglobin content of 35 to 45 and Arnaud points out that malaria is very prevalent and an anaemia-producing factor here.

An antigen was obtained by drying and powdering 1,000 hookworms. The powder weighed 0·9237 [gm.]. It was dissolved in ten times the original worm weight of an alcohol-acetone solution, whose proportions are unstated, and again diluted 15 to 20 times before use. Complement fixation occurred in 14 per cent. of negatives, 78 per cent. of those with up to 1,000 eggs [per gm.] and from 1,000 upwards averaged about 90 per cent. Intradermal reactions were hopelessly irregular. The diagnostic technique did not, of course, enable the absence of infection to be determined and since Arnaud holds that D.C.F. is certainly the most exact of these it seems surprising that it was not used where exact results are essential. *C. L.*

YENIKOMSHIAN (H. A.) & BERBERIAN (D. A.). **A Preliminary Report on the Incidence of Hookworm Disease in Syria and the Lebanon.** – *Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Mar. 31. Vol. 25. No. 5. pp. 399–406. With 1 map in text.

Essentially this paper deals with 1,700 faecal examinations made by a modified Kofoid and Barber technique on inhabitants of the Syrian coastal strip in which the mean annual temperature is "10·7°F." [70·7°F.] with hot, dry weather from May to October and temperate and wet weather from November to April, yet with a high atmospheric humidity at all times. The mean percentage of hookworm infection was 21·2 but in the vicinity of Sidon and Beirut 70 and 35 respectively, the worm being identified as *A. duodenale*. Striking features which are disclosed in the paper are (1) the amount of clinical ankylostomiasis which has appeared of recent years, for which two contributing causes are suggested, the influx of allied forces and Egyptian Labour Corps in 1918, and the substitution for mulberry cultivation of close set, bushy banana trees on land systematically irrigated and manured with night soil, (2) the "lightness" of the infection compared with the ill effects produced of which the following is a typical example :—

"A young girl (Case 13,952), from Djeldib near Beirût, had only 1,600 eggs per gram of formed stools, and after treatment passed only eight adult

hookworms in the three days subsequent to treatment; her red blood cell count on admission was 2,400,000 per c.mm.; her differential count showed 9 per cent. eosinophils; and her haemoglobin was 47 per cent. by Sahli's method of determination. Six weeks after treatment, stool examination showed no ova; she was strong and healthy, her red count had risen to 4,500,000 per c.mm.; her white count was 6,200 per c.mm. with 1 per cent. eosinophils, and her haemoglobin was 92 per cent."

An urgent plea is made for further investigation and effective control and it seems fair to suggest in comment that, seeing how serious the results of light infections have proved to be, a more delicate diagnostic technique is advisable in future. *C. L.*

DAENGSVANG (Svasti). **An Epidemiological Study of Hookworm Disease in a Rural Coastal Plain and a City Area of Porto Rico.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1932. Mar. Vol. 7. No. 3. pp. 359–375. With 1 folding chart. [15 refs.]

There are compared by Stoll's egg-counting technique, using apparently 0·02 gm. of faeces, specimens from 2 rural areas, A and B, the most obvious difference between the two being, apparently, that in A every house but one has a pit latrine 2 to 5 feet deep, while in B more than half have none. In A, infection was disclosed in 75 per cent. with an average egg count of 4,710 per gram and a range between 50 and 417,000. [Comparison of context and table shows that the stated average of 7,000 for 67 females is incorrect: the correct figure is 7,000 for 88 males and 1,700 for 67 females.] In B, infection was disclosed in 88 per cent., with an average egg count of 7,060 and a range between 100 and 81,400. In area C, a town area, figures are not directly comparable since when the weight of infection was too slight to be disclosed by Stoll's method, Willis's or even the smear was used. Only 27 per cent. of examinations were positive, with an average of 620 eggs per gram. Here sanitation is strictly enforced and house yards are of hard-packed soil. Soil pollution was investigated in the rural areas, and experimental studies were carried out on untrapped cultures. *C. L.*

TINIO (Joaquin R.). **Bradycardia in Ankylostomiasis. Observation in the Clinics, San Juan de Dios Hospital with Report of a Case followed for Five Months and Remarks on its Treatment.**—*Bull. San Juan de Dios Hosp. of Manila.* 1932. Apr. Vol. 6. No. 4. pp. 125–133.

In the author's experience bradycardia, not tachycardia, is the rule in hookworm disease, at least when the patient is lying down. A case is described in which repeated treatments with carbon tetrachloride failed to rid the faeces of ova [was there trichostrongylus infection?] while "squash seeds" were successful. The procedure was magnesium sulphate, 30 gm. and two hours later 80 gm. of pumpkin seeds in a syrup with orange flower water. *C. L.*

GARIN (Ch.), ROUSSET (J.) & GONTHIER (B.). Organisation de la lutte contre l'ankylostomose dans une exploitation minière: deuxième étape: le traitement et la prophylaxie. [**Organization of Measures against Hookworm in a Mine. Treatment and Prevention.**]—*Méd. du Travail.* Lyon. 1932. Mar. Vol. 4. No. 2. pp. 23–33.

In the first part of this paper which dealt with the industrial side of the infection and was summarized in *Bulletin of Hygiene*, Vol. 6,

p. 539, it was explained that diagnosis was by a modified Telemann's technique which was used also for grading infections according as 1 drop of the sediment spread under a 22 mm. square cover had in it 10, 11 to 100, or over 100 eggs. No persons in the first group, which is by far the largest, have been found to be the worse for their infection, but it is significant of the accuracy of this diagnostic technique that a person in this group will sometimes be positive and sometimes negative. The routine has been to treat those in the second and third groups as a matter of rule, but those in the first only if they come to hospital for some injury, for treatment was carried out in hospital only. Meat, alcohol, beans, lentils and carrots are forbidden ; legumes, soft food and milk are allowed. Thymol and tetrachlorethylene were given, the former particulated with carbonate of magnesia in capsules containing one gram, but whether more than one capsule was given is unstated. Tetrachlorethylene was also given in 1 gm. capsules, 3 on the first day. 4 on the second and 5 on the third, followed by sulphate of soda 40 gm, on the third day, a few persons complaining of drunkenness after it. With the latter drug 77·5 per cent. were disinfested after a single treatment, which is a better result than they obtained with thymol or that which, they state, others have obtained with other anthelmintics. [Though not quite analogous, the percentage of the total worm recovery by Caius and Mhaskar given by 4 gm. of particulated thymol in one portion, 1 cc. of ascaridole and 1 and 3 cc. of carbon tetrachloride were 99·4, 83·4, 90·8 and 95·7.] In prophylaxis any provision of privies in or disinfestation of the mine is held quite impracticable. The provision of privies on the surface, the treatment of carriers, and the prevention of reintroduction of infection by examination at the time of recruitment are the means on which reliance is placed, and heavily infected persons being presumably the greatest danger to the mine, treatment should begin with them. *C. L.*

Thiry (G.) & Dombray (P.). *Ancylostoma duodenale* et *Strongyloides stercoralis* dans les mines de fer de la Lorraine. [*A. duodenale* **and** *S. stercoralis* **in the Iron Mines of Lorraine.**]—*C. R. Soc. Biol.* 1932. July 29. Vol. 110. No. 27. pp. 1159–1161.

By direct examination, which presumably means by smear, or by coproculture in doubtful cases, 878 miners were investigated, with the discovery of 9 hookworm and 9 strongyloides infections. The mines have a temperature of 16° to 18°C. and are dry, except for the approaches where defaecation does not take place ; the men work shod and clothed ; the reaction of their stools is acid owing to their food, and the ore rough and likely to damage larval sheaths. Such are the characters suggested as in action in keeping down the infection rate. It is noted, however, that culturing is successful when the ore is used with faeces. All the strongyloides infections were in foreigners, and it is believed that they are gradually lost in the course of work in the mines. *C. L.*

Hirst (L. Fabian). **Hookworm Disease and Ceylon Sewage Works.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.) 1932. May 20. Vol. 2. Pt. 5. pp. 245–275. With 2 folding plans. [2 pages of refs.]

A short abstract cannot do justice to the quantity and quality of the work reported here. In 1919 ground itch followed by clinical hookworm disease occurred in coolies employed in the Colombo sewage

works to dig out trenches which had been filled at least 3 years earlier. In 1922 eight coolies immersed themselves, even to the neck, in foul sludge which they were emptying from a sump in a sewage pumping station, suffered within half an hour from intense irritation, and later had a severe eruption. A week afterwards it was found that all had a slight hookworm infection. But in spite of treatment then, 14 days later [by which time larvae entering with the irritation would be in the intestine and 2 mm. long] and again in 11 days, eggs reappeared in the stools 58 to 82 days afterwards, though worm counts then proved lighter than the extent of cutaneous irritation had seemed to render likely. Hirst suggests in explanation that some of the irritation was due to larvae of animal worms, since the sump drained an animal market; [but had not his timely treatment been most effectual?]. Detailed, carefully controlled, investigations both of effluent and sludge were carried on in two-storied Imhoff septic tanks receiving human sewage only from the Angoda Asylum, there being three tanks in series. Regarding eggs in the effluent, these were counted by D.C.F.F. [D.C.F. pushed to practical finality] with special care not to exceed the limit of effective concentration as shown by the type of collection spin by spin. The results were :—

	Hookworm ova.			Ascaris ova.	Suspended. solids
Detritus tank	21,000	11,200	15,500	39,000	483·0
No. 1 double storey tank	240	170	300	1,700	1·9
No. 2 „ „ „	180	90	100	200	1·2
No. 3 „ „ „	50	70	60	160	0·9

For hookworm ova saturated salt solution (1,200 S.G.) was used and for ascaris calcium chloride solution at 1,300 S.G. Regarding sludge, D.C.F.F. and Baermann's larval extraction method showed the following results :—

Day of rest in sludge pan.	Mean hookworm ova per gramme.	No. of hookworm larvae per 100 grammes approximately.
0	104	4,000
3	88	2,500
7	76	542
15	55	102
23	29	30
36	8	0
42	3	0
46	0	0

A de Saussure hot box (*San. Supp. Trop. Dis. Bull.* 1925, p. 130) showed that no infective larvae were detected if a sludge-faeces mixture were heated to 52°C. for 30 minutes and that in a glazed-cover lagoon this temperature was reached on the third day in March in Colombo and maintained thereafter. These lagoons were ordinarily used simply as drying pans. In one of them a quantity of faeces containing 18,000 ova mixed with sludge was placed in each of a series of small containers,

one of them being removed daily and cultured with loamy soil in vessels provided with larval traps; the 24 hour culture yielded 124 larvae and subsequent ones none. Pig latrines, in which dejecta run into a trough behind the latrine, and the family pig eats them empty, are rapidly being replaced by bored hole latrines which seem, it is held, "admirably suited to the habits of even the most primitive agriculturist," and in which larvae which attain maturity show, it is stated, no tendency to ascend towards the surface. *C. L.*

GRAUBNER (Friedrich). Ueberseeische Ankylostomiasis im Tropengenesungsheim Tübingen. [**Ankylostomiasis from Overseas in the Tubingen Convalescent Home.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Aug. Vol. 36. No. 8. pp. 429–439. [15 refs.]

The number of hookworm infections treated in this German convalescent home in the last 10 years is 193, from Asia, Africa and America. The infections in the main were light, as evidenced by the fact that 15 only were recognized by smear and 193 by a concentrative method, mainly the "NaCl method." There were among children 87 who harboured trichuris also, 26 who harboured ascaris, and 22 others who harboured both. As regards haemoglobin, measured by Sahli's instrument, 67 of 107 children had 75 per cent. or less before treatment, and 46 were in this category 3 to 4 weeks later; the like figures for eosinophilia of less than 10 per cent. were 53 and 93. In 98 children treated with oil of chenopodium 51 were held cured after one treatment, 23 after two, 4 after three, while 20 left the home uncured. *C. L.*

MAPLESTONE (P. A.). **Further Observations on Seasonal Variation in Hookworm Infection.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1145–1151. With 2 charts.

Maplestone continues his observations on seasonal variation in hookworm infection [this *Bulletin*, Vol. 28, p. 230]. In this case they comprised (1) the lines of a jute mill on the Hooghly with an efficient pan conservancy system used by most persons, (2) a crowded and insanitary village adjoining, (3) an adjacent, less crowded, less insanitary, village. About 200 stools were collected monthly from each section, examined by D.C.F., and on those found positive egg counts were done by Stoll's method. The population frequently changed, coolies working in three-months' contracts. In section 1, the lowest percentage of infection was 70·5 in April, the highest 83 in October; the lowest average egg count was 273 in March, the highest 773 in August. In section 2 the corresponding figures were, 69 in March, 85·5 in October, 252 in November and 841 in July. In section 3 they were 75 in January, 91 in September, 186 in October and 986 in July. It is pointed out that the highest egg counts per gram of faeces were in July and August and the highest monthly rainfall in July. Maplestone notes that his experience in Europeans on leave in Europe falls in with that of the PAYNES [*ante*, p. 64] and CALDWELLS [*ante*, p. 422, namely that when individuals are followed up, infection as measured by egg counts is not rapidly lost. To account for the discrepancy W. C. SWEET suggested to Maplestone, with diffidence, two possible explanations. that worms acquired in Bengal from April to June do not become established, or that hookworms are more prolific at that season in Bengal. Finally, in a Dooars tea garden on clay, D.C.F. and egg counts showed in 1930 infections far less heavy than in the neighbouring ones on sand already reported. *C. L.*

Hiller (W.). Zur Diagnose der Ankylostomiasis. [**Diagnosis of Ankylostomiasis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. June. Vol. 36. No. 6. pp. 343–344.

The argument is that the duodenum, where hookworms dwell, is by their invasion rendered tender, a sign which Hiller discovered by accident, one which he holds to be always present when there is infection and always absent when there is no evidence of infection, and one which will render unnecessary reliance on clinical symptoms and on costly and tedious microscopic examination. An editorial note points out that the habitat of election of hookworms is not the duodenum.

C. L.

Dove (Walter E.). **Further Studies on *Ancylostoma braziliense* and the Etiology of Creeping Eruption.**—*Amer. Jl. Hyg.* 1932. May. Vol. 15. No. 3. pp. 664–711. With 8 figs. [45 refs.]

After an historic survey, it is noted that of 301 cases of creeping eruption observed at Jacksonville, Florida the percentage distribution was: lower limbs 75·8, (chiefly in the feet) hands and arms 14·2, body 8·97. Experimental dogs and cats used were half-grown animals in which D.C.F. had on several occasions shown no eggs, the tests being supplemented by cultures. It was deemed necessary to undertake experiments to determine that in *A. braziliense* parthenogenesis does not occur and that it does not hybridize with *A. caninum*. Regarding effects of temperature, experiments described are held to show that thermotropism in larvae was demonstrated with dog, cat and rat skin, potato and the ear of a living kitten and that it is more active than histiotropism [at least thermoactivation was in evidence]. Creeping eruption by application of infective larvae of *A. braziliense* could not be produced on dog, cat, rat, guineapig or monkey, but the percentage of adults developing after oral infection was 26·03 in cats and 42·96 in dogs and after skin infection 14·22 and 13·57 respectively.

A boy of 9 was found harbouring *A. braziliense* only, that is to say, with larvae from this boy's stool, only this hookworm developed in kittens infected, and no hookworms developed in man, though striking creeping eruption did. On a later occasion larvae cultured from the boy's stool were made to infect two pups and a kitten and *A. caninum* was recovered from all three; these larvae were also placed on the skin of a man who later after treatment voided 18 female and 14 male *Necator americanus*. The conclusion reached is that the boy had lost his *A. braziliense* infection and acquired others with *A. caninum* and *N. americanus*. [The means employed to determine that the boy's stool was used on all occasions do not seem mentioned, nor does he seem to have been subjected to treatment to determine his real infection.]

C. L.

Cruz (Walter Oswaldo). Hypothese sobre a pathogenia da anaemia na ankylostomose. Papel preponderante da deficiencia de ferro no organismo. [**The Pathogeny of Hookworm Anaemia.**]—*Brasil-Medico.* 1932. July 2. Vol. 46. No. 27. pp. 593–597. English summary.

The author relates two cases with closely similar symptoms. The patients suffered with ankylostomiasis and resultant anaemia; one

had 2,800,000 red corpuscles and 25 per cent. Hb., the other 2,500,000 corpuscles and 26 per cent. Hb. The former was given 4 doses of anthelmintic at 7 day intervals and 2 ascaris and 529 hookworms were expelled. The blood 31 days after the beginning of treatment was but little improved—red blood corpuscles 3,400,000, Hb. 28 per cent.—in fact the differences were almost within the limits of error. The anisocytosis, poikilocytosis, and the oligochromaemia remained unchanged. The diet during treatment was, intentionally, poor in iron.

The second patient was given raw liver 250 gm. daily and small doses of iron preparations intramuscularly, but without result. Naegeli's method of giving Ferrum redactum, 3 gm. daily, was then tried. Twenty-one days later a blood examination showed red cells 4,540,000 and Hb. 70 per cent., no anisocytosis or poikilocytosis.

The author concludes that, as the treatment of ankylostomiasis by vermifuges does not of itself modify materially the blood picture, whereas reduced iron in large doses, without vermifuges, effects rapid blood regeneration, the anaemia of hookworm is due to faulty metabolism of iron.

[It is clearly unsafe to draw so important a deduction from a single case and recent studies tend to throw doubt on the conclusion that *ordinarily* hookworm anaemia is due to faulty iron metabolism.]

H. H. S.

Bachman (George W.) & Rodriquez-Molina (R.). **Skin Hypersensitiveness to Hookworm Antigen.**—*Amer. Jl. Trop. Med.* 1932. July. Vol. 12. No. 4. pp. 279–284.

These skin tests cover 2,392 individuals.

" The present experimental results demonstrate that in certain individuals there is a marked cutaneous hypersensitivity to extracts of *Necator americanus*. In a large percentage of cases this hypersensitivity can be detected by using extract of *Ascaris lumbricoides*. . . . The authors feel that for practical application of the skin test in detecting the presence of *Necator americanus*, the measurable characteristics are too variable, and that group reactions among the Nematodes are not significantly specific."

[The diagnostic technique used with the hope of determining whether in fact the " negatives " were negative is nowhere stated, a matter of primary importance.] *C. L.*

Kitamura (K.). Sensibilitätsänderungen der Haut gegen Hakenwurmlarven durch intrakutane Impfungen der Stoffwechselprodukte dieser Larven. [**Local Reactions to Intracutaneous Injection of Extracts of Hookworm Larvae.**]—*Japanese Jl. Dermat. & Urol.* 1932. Feb. Vol. 32. No. 2. [In Japanese pp. 104–111. With 8 figs. on 2 plates. German summary p. 11.]

If extract of infective larvae of *A. caninum* in Ringer's solution is repeatedly injected intradermally into the same spot on a rabbit's back, the reaction becomes less and less, and that spot reacts less to the entry of the larvae themselves than does the skin of a normal animal, even if the point of infection into the latter has previously been injected with Ringer's solution. *C. L.*

KAWANISHI (S.). Befunde in Magensaft bei Necator-Wirten. [**The Gastric Juice in Hosts of Necator.**]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1931. Nov. Vol. 30. No. 11 (320). [In Japanese. Germany summary pp. 87–88.]

Kawanishi infected 3 healthy men by mouth and 3 by skin with necators and examined the gastric juice 3 times in each case, once before infection, a second time while leucocytosis and eosinophilia were marked, and a third time after disinfestation. The results were these :—

	Oral infection			Skin infection		
		Cases			Cases	
	1	2	3	4	5	6
Total acidity at examination 1	60	61	43	56	46	61
„ „ 2	87	79	32	66	34	58
„ „ 3	78	70	38	63	40	60
Free HCl at examination 1	0·106	0·172	0·084	0·146	0·065	0·153
„ „ 2	0·172	0·180	0·066	0·139	0·069	0·095
„ „ 3	0·142	0·168	0·066	0·124	0·106	0·146

Little relationship was found between degree of infection and gastric acidity. The method of determining freedom from infection is not mentioned in the German summary. *C. L.*

FOSTER (A. O.) & DAENGSVANG (S.). **Viability and Rate of Development of the Eggs and Larvae of the Two Physiological Strains of the Dog Hookworm,** *Ancylostoma caninum.*—*Jl. Parasitology.* 1932. June. Vol. 18. No. 4. pp. 245–251.

" The method of McCoy for obtaining hookworm eggs free from feces and growing the larvae in pure cultures of bacteria presented a means of comparing the viability and rate of development of the eggs and larvae of the two physiological strains of *Ancylostoma caninum.* For eggs of the dog strain, there was obtained a percentage hatching of 89 per cent. at 21°C. and 50 per cent. at 31°C. as compared to 28·5 per cent. and 20 per cent. respectively at similar temperatures for the eggs of the cat strain. Studies of the development of the eggs to the infective larval stage showed, for the dog strain, 44 per cent. at 21°C. and 47 per cent. at 31°C., and for the cat strain, 5 per cent. at 21°C. and 6 per cent. at 31°C. From these figures the percentage development of hatched larvae to the infective larval stage was computed. For larvae of the dog strain, this figure was 49 per cent. at 21°C., and 94 per cent. at 31°C., while for the cat strain, the figures were 17 per cent. and 30 per cent. respectively. These findings add to the number of experimentally demonstrated differences betweeen the cat and dog strains of *A. caninum.*"

[For MCCOY's method see this *Bulletin*, Vol. 27, p. 426.] *C. L.*

FOSTER (A. O.) & CORT (W. W.). **The Relation of Diet to the Susceptibility of Dogs to** *Ancylostoma caninum.*—*Amer. Jl. Hyg.* 1932. July. Vol. 16. No. 1. pp. 241–265. With 4 graphs. [24 refs.]

The normal diet used was of cooked pig lung, bread, powdered milk, yeast and cod liver oil ; it maintained dogs in health and vigour.

The deficient diet was of " 35 per cent. corn starch, 35 per cent. dried ground peas, 29 per cent. mazola oil, 1 per cent. NaCl (C.P.), and an abundant supply of water " ; it was readily eaten, satisfied hunger, was very deficient in all vitamins and important minerals and poor in protein, and produced rapid loss of weight and general decrease in bodily vigour. Infection was by feeding with numbered larvae given in double capsules, stools were sieved, and eggs were counted by Stoll's technique ; but D.C.F. was relied on to disclose light infections since Stoll's technique could not detect them, and this condition, as was shown, persisted in one case for 17 weeks. Nine dogs were used. As regards infectivity, the dogs showed resistance to infection when on the normal diet, but receptivity when on the defective one, infectivity being displayed by appearance or definitely increased numbers of eggs, beyond what were explicable by the erratic variations in counts sometimes apparent. As regards variation in egg production, in one dog (538) on deficient diet for a fortnight after infection with 500 larvae the eggs per day numbered 318*, a fortnight later 1,027 when normal diet was resumed, and six weeks later merely a positive to D.C.F. but when the dog, reinfected after treatment to disinfestation as measured by D.C.F., was kept on the deficient diet, the count rose to 29 in 4 weeks and fell steadily to 9 in 8 weeks. Its companion (522) showed changes almost exactly parallel. Since the second fall in egg counts did not coincide with a change in diet, it seems unreasonable to ascribe the first fall to this change. Both falls were accompanied by passage of significant numbers of worms in the faeces. In 3 other dogs a change from normal to deficient diet took place 16 days after their last infection. Five days later, at the next weekly numbering their egg counts were 145, 74, and 96 ; 7, 7, and 5 weeks afterwards they were 1,113, 746 and 525, an increase of 5 to 10 times with no intermediate experimental infections. Another dog (668) infected with 1,000 larvae showed, while on normal diet, an average of 315 eggs in weeks 3 to 7, was put on deficient diet, with average egg counts 315, 388 and 408 in the next three 5-week periods, and of 1,422 in the subsequent fortnight, after which it was treated. Its pair (709) infected with 500 larvae showed a maximum count of 1,555 five weeks later and an almost steady fall to 11 during the next six weeks, again accompanied by passage of significant numbers of worms ; when then changed to deficient diet eggs showed, though with marked irregularities, an increase to 578 eight weeks afterwards. The author's conclusions are :—

" We advance as a working hypothesis the view that in human hookworm heavy infestations may be more easily built up in people on deficient diets, and that not only the injury of the worms to their hosts may be reduced, but also that the worms themselves may be partially or wholly eliminated by improvement in diet alone."

[At least in proportion as their experiments are viewed as unimpeachable, so does the egg count as a measure of worm numbers suffer yet more damage in prestige.] *C. L.*

Faust (Ernest Carroll). **The Symptomatology, Diagnosis and Treatment of Strongyloides Infection.**—*Jl. Amer. Med. Assoc.* 1932. June 25. Vol. 98. No. 26. pp. 2276–2277. [13 refs.]

The life history of the parasite is reviewed including Faust's observation that infective larvae may be produced in the intestine itself. In

* All figure of eggs in thousands, *i.e.*, 318,000

considering differential diagnosis of rhabditiform larvae there is the note, " in freshly passed stools the hookworm embryos are almost always within the unhatched eggs." Faust is satisfied that "occasionally parasitic females and males are passed in diarrheic stools. . . . The rare parasitic males are practically indistinguishable from the free-living males of the indirect cycle." It is noted that the acute local inflammatory reaction in the lungs, the result of migration of the larvae from the capillaries into the bronchioles, " parallels the bronchial pneumonitis observed in ascariasis " but has not been reported for hookworm infestation. At least 200 cases have been treated on Faust's advice with gentian violet, and of 47 followed up 45 have been disinfested. The treatment [*ante*, p. 70] is continued for from 7 to 10 days, but in 4 cases 2 courses were needed. [Perhaps the terms applied to pulmonary lesions have been misunderstood by the reviewer, but it seems wise to point out that for hookworm infections pulmonary lesions were illustrated by Looss (1911) in the second part of his monograph and were amply confirmed by Blacklock and Adler (*Annals of Tropical Medicine and Parasitology*, 1922, Vol. 16, p. 291). Regarding symptoms, Looss points out that as early as 1880 Bozzolo and Pagliani in drawing attention to the St. Gothard tunnel anaemia, commented on irritant skin troubles, and on subsequent pulmonary symptoms preceding the anaemia. Apart from intermediate observations Payne (*American Journal of Hygiene*, 1923, Vol. 3, p. 584) reported evidence of catarrh of the air passages after infection by 69 hookworm larvae and the condition has since been observed.] *C. L.*

Hedrich (W.). Ueber einen Fall von seltener Darmparasitenerkrankung (*Anguillula intestinalis*) bei einem Bergarbeiter des Zwickauer Reviers.—*Klin. Woch.* 1932. May 14. Vol. 11. No. 20. pp. 866–867.

Schmidt (Adam.) Beitrag zur Biologie der *Anguillula intestinalis*. [**Biology of *Strongyloides stercoralis* in a Miner.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Mar. 30. Vol. 124. No. 3/4. pp. 177–180. [17 refs.]

A miner who had never been further afield from Zwickau than Serbia showed sexual free living forms of *Strongyloides stercoralis* when his stools were cultured over a period of 5 months. This, it is pointed out, is contrary to Leichtenstern's hypothesis of geographical distribution of forms showing heterogony [see this *Bulletin*, Vol. 23, p. 759]. Eosinophilia and wasting were marked. Neosalvarsan and oral gentian violet are advised in treatment. *C. L.*

Miller (J. J.), Jr., McCoy (O. R.) & Bradford (W. L.). **Intravenous Treatment in Experimental Trichiniasis.**—*Jl. Amer. Med. Assoc.* 1932. Apr. 9. Vol. 98. No. 15. pp. 1242–1245. [14 refs.]

Since the death rate of trichinosis in man is only about 6 per cent. animal experiments are necessary to evaluate trichinicidal drugs; and since the number of larvae recovered from 50 gm. of muscle in rabbits (diaphragm 3, tongue 4, masseter 5, abdominal 8, intercostal 10, thigh 20 gm., were the details used) when this quantity was digested in pepsin and hydrochloric acid varied from animal to animal, when these had been fed with the same number of encapsuled larvae,

the number of animals used must be considerable before results can be trusted. Although the number used in these experiments was not large there was no demonstrable therapeutic effect when infected animals were injected, rabbits apparently always intravenously, with various drugs. The drugs tested on rabbits were neoarsphenamine, antimony and potassium nitrate, acriflavine base, rivanol, gentian violet, metaphen and Lugol's compound iodine solution, and in rats sodium iodide intraperitoneally. *C. L.*

Penso (G.). Présence des oeufs d'oxyures en pleine muqueuse intestinale et biologie des oxyures. [**Biology of Oxyuris. Presence of Eggs in Intestinal Mucosa.**]—*Ann. Parasit. Humaine et Comparée.* 1932. May 1. Vol. 10. No. 3. pp. 271–275. With 6 figs. on 1 plate.

The occasional presence of oxyurids within the wall of the human appendix is established. Troisier and Deschiens (*Ann. Parasit. Humaine et Comparée*, 1930, Vol. 8, p. 562) have reported the complete perforation of the intestine by oxyurids in the chimpanzee. Penso reports that the eggs of *O. ambigua* of the hare can be found in the intestinal gland lumen. From these facts the following conclusions are drawn. In oxyurids, copulation takes place in the intestine ; the females then enter the intestinal wall and oviposit ; this explains the rarity of eggs in the stool and the reappearance of infection after treatment, for the eggs need never leave the host (unless to pass infection on to another host when the female migrates out of the anus) for infection to persist in him. *C. L.*

O'Connor (F. W.) & Hulse (C. R.). **Some Pathological Changes associated with** *Wuchereria* [*Filaria*] *bancrofti* **Infection.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. May 14. Vol. 25. No. 6. pp. 445–454. With 1 chart in text & 22 plates.

This sumptuously illustrated paper deals with a boy of 12½ years who had spent 11½ years in endemic Porto Rico and the last year in non-endemic New York. There, examination during an attack of acute pneumonia disclosed palpable lymph glands in axillae, epitrochlear regions and groins and a fairly large soft swelling in the right inguinal region. The pneumonic fever did not cause the disappearance of microfilariae from the blood, and ten days after it ceased by crisis the swelling in the right inguinal region was excised.

" Believing Lane's hypothesis (1929 and 1931) of cyclical parturition to be correct, and considering later observations recorded by the author (1931) regarding the possible hour of parturition, the following view was expressed at the time of operation : " *If living female worms are present the condition of intra-uterine development will be identical in each parasite and, considering the time when the operation is being performed, it is expected that ova but no microfilariae will be present in the uteri of the parasites.*"

By cutting the whole excised mass into serial sections this prognostication was exactly fulfilled. Twenty-one adult filariae were identified in 3 of the 5 glands removed, 2 containing none, and it is estimated conservatively that these 3 glands probably contained originally from 26 to 30 of them. They were accompanied by marked pathological changes (the evidence for and character of which must be sought in the original) in one who had complained of no symptoms and whose infection was disclosed merely as the result of a

routine examination. Hyperfilariation may occur then in the first decade of life. Most filariae in glands lie in the afferent approaches or cortical sinuses. The evidence confirms the hypothesis that cyclical parturition is the cause of filarial periodicity, suggests that parturition of the periodic *W. bancrofti* of Porto Rico occurs about midday, and shows that it is filariae and not bacteria which cause the pathological changes of filariasis, while these changes are in some way associated in the main with aseptic degeneration and absorption of dead adult filariae. The evidence for these conclusions is fully set out in print and picture. *C. L.*

O'Connor (F. W.). **The Aetiology of the Disease Syndrome in *Wuchereria bancrofti* Infections.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. June 30. Vol 26. No. 1. pp. 13–33. [51 refs.]

The text for the carefully arranged line of argument of this paper lies in this sentence : " That the presence of bacteria is necessary to the occurrence of most of the pathological changes and all the inflammatory phenomena associated with filariasis is here called into question as not proved," and an attempt is made to revalue the respective roles of bacteria and worms in this infection. The first step consists in the production of evidence that there exists a local, even a minutely local, topographical correlation between the symptoms which have been grouped together as chronic filariasis, the filaria, and its insect vector ; next is marshalled evidence showing that there is no real correlation between chronic filariasis and those bacteria with which it has been deemed to be associated, the case being strengthened by the examples of other diseases involving the lymphatics in which bacteria are not a factor ; and the evidence is summed up in the conclusion " It will be seen that there is no consistency in bacteriological findings in filarial infection. The presence of . . . organisms has been demonstrated ; but no bacterium has been found that can be directly associated with a series of filarial conditions which is as specific in type as pneumonia or typhoid." When there is entrance of bacteria into filarial tissues this is held to be secondary ; thus during recovery from acute filarial lymphangitis there is intense itching, scratch marks are a feature of the condition, and their sufficiency to introduce secondary bacterial infection is obvious. The massive serial section method employed by O'Connor has led to the conclusion that, while adult parasites live, no serious inflammatory or obstructive phenomena develop though obliterative endolymphangitis may appear ; but that on their death conditions are quite otherwise. Degeneration of adult parasites occurs in one of 3 ways ; by calcium deposit in the worm, by lymph coagulation, and by a combination of the two. Similarly, so long as microfilariae live, there is no evidence that they damage the tissues ; but " evidence is accumulating to show that the microfilariae of *W. bancrofti* are born one day and die the next " and that in dying they do damage tissues.

Acute filarial lymphangitis is considered from the points of view of anatomy, haematology, symptomatology and treatment, and it is held that this acute reaction is allergic in character and corresponds to a period when sufficient protein is liberated from recently dead worms to overcome the resistance set up by previous sensitization. It is concluded, then, that the pathological and acute inflammatory changes found [they are particularly described] are due to the filariae themselves, living or dead. This conclusion presupposes hyperfilariation ;

and the evidence of many observers for its existence is put forward, with the suggestion that, since many worms have already been found after examination of small blocks of tissue taken from the near-normal person, in cases showing advanced filariasis evidence for the existence, past or present, of hundreds of worms in one individual will eventually be obtained.

The discussion was informative. The President, Dr. G. Carmichael Low, recalled his paper read before the Society in 1908 where he instanced the case of Grenada where, with an insect intermediary present and infected Barbadians reaching the island, there was no filariasis, and that he gave it as his then conviction that the worm was the essential factor in the disease ; he had long been cognizant of heavy infections. Dr. MANSON-BAHR listed the congenital and acquired forms of elephantiasis in man. Dr. CHESTERMAN drew analogies with other filariae and instanced hyperfilariation in Loa. Dr. Hamilton FAIRLEY commented on the fitness of things in that one of MANSON'S pupils should now be making conspicuous additions to the knowledge of a disease which so greatly appealed to MANSON, dealt with the allergic reaction, and recounted a case where delayed, persistent and extensive wheal-formation followed intradermal injection of antigen into an elephantoid limb. He believes that a negative reaction to Dirofilaria antigen might well prove to be of more value in excluding filariasis as a cause of elephantiasis than the reverse, and did not regard it as a satisfactory means of detecting circulatory antibody in filariasis though eminently so in Loa infection. Dr. BUXTON stressed the importance of investigating the near-normal man, and suggested that while differences in types of disease in different countries might be due to differences in the worm, it seemed to him more probable that they depended on small differences in lymphatics in different races of man. Col. Clayton LANE suggested that the use of the lymphatic or blood "escalator," and the local "suitability" of tissues, reached by the infective larvae through the use of these mechanisms, adequately explained the distribution of the adults which O'Connor had demonstrated. He deprecated the suggestion that the muzzled microfilaria could pass actively through tissues, and hoped that O'Connor's further investigations would reveal the happenings of the cryptic 12 hours between midday which, as O'Connor's work already showed, was the hour of parturition for periodic *W. bancrofti* and midnight the hour at which microfilariae were massed in the circulating blood. *C. L.*

BRUG (S. L.). Filariasis en elephantiasis. [**Filariasis and Elephantiasis.**]—*Nederl. Tijdschr. v. Geneesk.* 1932. June 4. Vol. 76. No. 23. pp. 2772–2776.

The reputed causal relationship of filarial infection and elephantiasis is still subject to attack and criticism but no writer has seen fit to remove elephantiasis from the filarial diseases to those of unknown causation. An investigation of a population in which some suffer and some are free from filarial infection shows that it is the latter who are afflicted with elephantiasis. The correlation is a negative one, but none the less a correlation. It is not the same persons who show both conditions but it is the same community. And yet there exists no proportionality between the filarial index and elephantiasis frequency. The latter may be very variable in localities with the same worm index. Some other factor than filarial infection must be the explanation of the development of elephantiasis. Clinically it is known that

this affection is preceded by attacks of lymphangitis and fever, which last a few days and return again in a few weeks time. These attacks by degrees account for the condition of elephantiasis. It is not the filariae which cause the lymphangitis, for the great majority of sufferers from filariasis do not have lymphangitis. It must be caused by bacterial infection and especially by streptococci. A further proof of the connexion between these two conditions is afforded by the occurrence of " relapsing lymphangitis," especially among these communities affected by filariasis. During an attack of lymphangitis all microfilariae disappear from the blood and it seems reasonable to explain this by the death of microfilariae and perhaps of the adult worms. The sequence may be given as, filariae, lymph stasis, predisposition to bacterial lymphangitis, recurrent lymphangitis with progressive thickening of the skin, death of filariae, elephantiasis. It is to be admitted, however, that the explanation is still hypothetical in some respects. In the Dutch East Indies *Filaria malayi* is more common than *Filaria bancrofti*. Some evidence is furnished to show that the former is more associated with elephantiasis of the legs and the latter with elephantiasis of the genitalia. *W. F. Harvey.*

PATERSON (James C.). **Observations on Filariasis in Colombia.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 169–176. With 1 chart.

The first case of recognized filariasis found at Barranca was in November, 1929, though examination of records shows a surprising number of nonvenereal inguinal bubos admitted to hospital during the last few years. Paterson describes 12 cases which have come under his care during the last 2 years, all substantiated by the finding of *Mf. bancrofti* in the night blood. Points of importance are : (1) the extreme fewness of microfilariae, so many examinations being often needed that enthusiasm has waned, and few direct diagnoses are now attempted. (2) The slightness of symptoms, often merely an enlarged and tender groin gland, myositis once and elephantiasis once. The treatment found most effective in lessening symptoms, though it appeared to influence microfilarial numbers not at all, consisted in T.A.B. injections, the first dose varying from 50 to 100 millions, while each was followed by a rise in temperature to about 104°F. Half the cases showed immediate relief of their symptoms and no relapse occurred within observation periods of 7 to 22 months. In two persons relapse occurred, though in one murdering bandits curtailed the desired observation period. The elephantiasis case was not bettered. Though the infections were so slight they were disabling and commercially significant. The labour, drawn from districts bordering the Magdalena river, is of age between 20 and 30 years. *C. L.*

HOFFMAN (W. A.), MARIN (R. A.) & BURKE (A. M. B.). **Filariasis in Porto Rico.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1932. Mar. Vol. 7. No. 3. pp. 312–358. With 6 figs. & 1 map on 4 plates. [19 refs.]

A detailed survey of great local importance already in part reported on [this *Bulletin*, Vol. 26, p. 544]. The author's conclusions are :—

" During the course of a survey having for its object the study of the incidence of filariasis, 4,950 individuals were examined in various localities of Porto Rico.

"The disease is present in a number of communities of the eastern, western and northern coasts.

"Aguadilla and parts of San Juan are the most important endemic foci.

"Caguas, in the interior, is an endemic area of some importance.

"Infection with *Mansonella* (*Filaria*) *ozzardi* has been found on one occasion in a person who has always lived in Porto Rico." *C. L.*

Khalil (M.), Halawani (A.) & Hilmy (I. S.). **On the Transmission of Filariasis Bancrofti in Egypt.**—*Jl. Egyptian Med. Assoc.* 1932. June. Vol. 15. No. 6. pp. 317–322.

"1. *Culex pipiens* is a most efficient intermediate host of *Wuchereria bancrofti*. It is also the most common Egyptian mosquito. The females of this species which were fed on filarious individuals showed 100 per cent. infection of larval filariae. None of these larvae showed degeneration or chitinisation.

"2. The larva of *Wuchereria bancrofti* completes its cycle in about 14 days at a temperature of 29°–31° C., in about 15 days at 26°C. and in about 20 days at 23°–24°C.

"3. The mature larva either makes its way direct to the head and then to the proboscis, occasionally to the palps, or it wanders first in the haemocele before it goes finally to the head.

"4. The larva moults twice; the first moult is about the 5th–7th day and the second is about the 11th day." *C. L.*

Thoulon (L.). Sur quelques accidents consécutifs à l'infestation filarienne, observés au Gabon (1929–31). [**Symptoms of Filarial Infestation seen in Gabon.**]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 234–237.

Whereas, Thoulon writes, it seems admitted that nearly all doctors in French West and Equatorial Africa dismiss filariasis as practically negligible, he notes that in a community of 35 Europeans, in Gabon, F.E.A., with whom he has been in daily contact, this is not the case, for 14 of them had, he states, an established filarial infection and 6 of them showed more or less serious symptoms. These consisted of itching, Calabar swellings, and the passage of Loa worms about the eye, together with anaemia and nervousness. One he had to invalid home.

C. L.

Jame (L.) & Jude (A.). Hydrocè e filarienne. [**Filarial Hydrocele.**—*Rev. Méd. et Hyg. Trop.* 1932. Jan.-Feb. Vol. 24. No. 1. pp. 17–20.

A man of 50 who had served many years in Martinique was admitted to the Urological Service, Val-de-Grâce, for a right hydrocele with some discomfort. The scrotal skin was normal. The mass proved to be a chylocele containing many living active microfilariae measuring 250μ long and identified as *Mf. bancrofti*. Although they were stained and examined no sheath is mentioned. There were no microfilariae in the night blood and no eosinophil cells at all. *C. L.*

Harley (G. W.). **A Theory regarding the Rôle of Insect Saliva in Filarial Periodicity.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. May 14. Vol. 25. No. 6. pp. 487–491. [14 refs.]

"It is the purpose of this paper to suggest the hypothesis that there is a specific positive chemiotaxis acting on the microfilariae to cause them to

migrate toward the saliva of the host insect, and that this same chemical substance in the insect's saliva may act as a stimulant to initiate parturition in the female filaria."

It is evidently an active migration which is postulated here. In this way is explained the finding, described by O'Connor [this *Bulletin*, Vol. 28, p. 681], of microfilariae reaching the blood vessels of the spermatic cord; by a positive chemiotaxis they took the shortest route to a definite attraction, that of the insect's saliva which would at that hour be in highest local concentration in the blood. When the foreign protein of insect saliva becomes concentrated in lymph gland or kidney, the microfilariae will be attracted in those directions to their final destruction. Similarly since, it is stated, "O'Connor has observed that the time necessary for the development of mature ova into microfilariae is roughly 12 hours," and since parturition occurs about noon, these facts invite the speculation that the biting insect's saliva may possibly furnish the stimulus or release from the inhibition of a "resting stage," which is believed to occur at an early period of development of the ovum, and so initiate the process of cyclical reproduction. The bite of a hyper-infected *Culex fatigans*, which insects are particularly active in the dark phases of the moon, may possibly, by the injection of saliva saturated with filaria protein, initiate an attack of lymphangitis in one already sensitive to filarial protein. *C. L.*

Craig (Chas. F.). **The Possible Chemotactic Effect of the Salivary Secretions of Certain Insects upon Microfilariae.**—*Science.* 1932. May 27. Vol. 75. No. 1952. pp. 561–562.

In reference to the finding of Strong [*ante*, p. 82] that microfilariae of *O. caecutiens* are more numerous in the transmitting fly than in an equivalent quantity of blood drawn direct, Craig says that Ashburn and himself reported a similar phenomenon in 1907. In investigating the development of the microfilaria of *W. bancrofti* in *C. quinquefasciatus* they noted that blood ingested by the mosquito contained many more embryos—40–50 times as many—than they could find in approximately the same amount of blood from the patient. The matter, he thinks, merits further study. *A. G. B.*

Dunn (Lawrence H.). **A Simple Method for collecting Adult Filarial Parasites from Muscle Tissues of Monkeys.**—*Jl. Parasitology.* 1931. Dec. Vol. 18. No. 2. pp. 111–112.

Faust informed the Gorgas Memorial Laboratory that a filaria parasitizing the squirrel monkey *Leontocebus geoffroyi* inhabited the muscles. No success having attended Dunn's attempt to extract these very delicate worms, about 9 cm. long, a successful attempt was made to induce them to migrate actively and collect themselves. The technique finally adopted was to flay the animal immediately after death, cut off the feet, remove the viscera, allow the body to cool for a few minutes, separate the muscle groups with a scalpel, wash with water to remove blood which would later hinder clear vision of the parasites, immerse the body in normal saline, and place in an incubator at 99°F. for 2 to 4 hours. Some of the filariae at least escape into the fluid and are readily collected. Their genus and species are unnoted. *C. L.*

Hauer (Aug.). Kasuistischer Beitrag zur Symptomatik und zum Blutbild der Loainfektion. [**The Symptoms and Blood Changes in Loa Infestation.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 181–185.

The report concerns 2 men with no microfilariae in the blood. In one, the first skin symptoms suggestive of Loa infection occurred 3 years after he first reached and 1½ months after he finally left an endemic area. Eosinophilia was a marked feature in both cases, up to 75·5 and 78·5 per cent. *C. L.*

Gore (K. B.). **Cases of** *Dracunculus medinensis.*—*Jl. Roy. Army. Med. Corps.* 1932. Apr. Vol. 58. No. 4. pp. 288–289. With 1 text fig.

From May to September, 1931, eleven guineaworm cases were admitted to the Indian Military Hospital, Kowloon, Hong Kong, all contracted in Hissar, Punjab, India, with an average incubation judged as ten months. Ten cases were plural infections; thus eight worms were removed from one man, 5 whole and 3 broken, cellulitis and abscess developing in these 3. Treatment was by douching and immersing the part in cold water, injection into the worm of 2 per cent. cocaine solution, and gentle and gradual traction. Urticaria might be associated with the blister formation. *C. L.*

Connell (W. K.) & Buchanan (J. C. R.). **Guinea Worm Disease in Tanganyika.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. June 30. Vol. 26. No. 1. p. 99.

This is believed to be the first recorded case of dracontiasis *acquired** in Tanganyika. This Indian's movements are accounted for over a period, so far as can be judged, of something under a year, which does not seem completely to cover the possible incubation period. This and three other cases mentioned constitute all the references to guinea-worm in the medical records of the Territory. *C. L.*

Mühlens (P.). Ueber Filarieninfektionen in Sud- und Mittelamerika, insbesondere *Onchocerca caecutiens* in Mexiko. (Sammelreferat).—[**Filariasis in South and Central America, especially** *O. caecutiens.*] *Arch. f. Schiffs- u. Trop.-Hyg.* 1932. May. Vol. 36. No. 5. pp. 287–300. [Refs. in footnotes.]

A valuable review of the literature for German readers. *C. L.*

Boucher (L.). Une Infection multiple par les helminthes.—*Rev. Méd. et Hyg. Trop.* 1932. Mar.–Apr. Vol. 24. No. 2. pp. 79–82.

Büchner (S.). Askaridenkuren bei Kindern mit Helminal.—*Muench. Med. Woch.* 1932. July 29. Vol. 79. No. 31. p. 1241.

Drake (D. C.) & Coulter (J. L. S.). A Case of Schistosomiasis Vesicae.—*Jl. Roy. Nav. Med. Serv.* 1932. Apr. Vol. 18. No. 2. p. 134.

Higazi (Ibrahim). Bilharzial Papilloma of Lower End of Ilium causing Intussusception and Undergoing Malignant Change.—*Jl. Egyptian Med. Assoc.* 1932. May. Vol. 15. No. 5. p. 303.

*Italics in original.

Higazi (Ibrahim]. Bilharzial Tumour at the Tip of the Appendix causing Intestinal Obstruction.—*Jl. Egyptian Med. Assoc.* 1932. May. Vol. 15. No. 5. pp. 303–304.

Khalil (Mohamed) & Hassan (Aly). The Serum Globulin in Human Schistosomiasis.—*Jl. Egyptian Med. Assoc.* 1932. May. Vol. 15. No. 5. pp. 211–231. [14 refs.] [See this *Bulletin*, Vol. 29, p. 411.]

Kitamura (K.) & Nakamura (M.). Weitere experimentelle Studien ueber Dermatitis durch Hakenwurmlarven.—*Japanese Jl. Dermat. & Urol.* 1932. Apr. Vol. 32. No. 4. [In Japanese pp. 307–317. With 1 chart. [22 refs.] Germany summary p. 39.]

Lodato (Gaspare). Bilharziosi vesicale e reperto di *Bullinus*, *Melania* e *Limnaea* in alcune località del Fezzan (Tripolitania).—*Arch. Ital. Sci. Med. Colon.* 1932. Apr. 1. Vol. 13. No. 4. pp. 235–240. English summary (5 lines).

Longo (Domenico). Intradermoreazioni specifiche e aspecifiche nell'echinococcosi.—*Policlinico.* Sez. Med. 1932. Apr. 1. Vol. 39. No. 4. pp. 202–208. [23 refs.]

Najera (L.). Una nuova tecnica per la numerazione di uova di elminti nelle feci (camera di Zschucke).—*Arch. Ital. Sci. Med. Colon.* 1932. Apr. 1. Vol. 13. No. 4. pp. 207–214. With 3 text figs. English summary (4 lines).

Nakajima (Katsumi). Experimental Study on the Development of *Anchylostoma duodenale*. (Third Report.) Development of Larvae of *Anchylostoma duodenale* Dubini obtained from the Lung of Percutaneously Infected Puppy and subsequently given to Rabbit.—*Japanese Jl. Experim. Med.* 1932. Apr. 20. Vol. 10. No. 2. pp. 115–122. With 7 figs. on 1 plate.

Pieri (Gino). Appendicite acuta da tricocefalo.—*Policlinico.* Sez. Prat. 1932. Mar. 21. Vol. 39. No. 12. pp. 458–460. With 1 text fig.

Posselt (Adolf). Erster und einziger Bericht ueber einen spontanen und sichtbaren Durchbruch von Askariden durch den Nabel und zwar bei einer Erwachsenen.—*Schweiz. Med. Woch.* 1932. July 16. No. 29. pp. 661–663. [24 refs.]

Spoto (Pompeo). Sindrome tossica da *Ascaris lumbricoides* in soggetto malarico.—*Riv. Sanitaria Siciliana.* 1932. Mar. 15. Vol. 20. No. 6. pp. 401–406, 409–411. With 2 charts. [13 refs.] English summary (5 lines).

van Thiel (P. H.) & Wolff (A. E.). Een vergelijking der chemische methoden tot het scheiden van de larven der mijnwormen van mensch en dier van die der vrijlevende nematoden.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. June 21. Vol. 72. No. 13. pp. 836–841. [See this *Bulletin*, Vol. 29, p. 422.]

Willoughby (Hugh). The Treatment of Intestinal Helminthic Infections in Man.—*Jl. Roy. Nav. Med. Serv.* 1932. Apr. Vol. 18. No. 2. pp. 112–115.

TYPHUS AND UNCLASSED FEVERS.

BRUMPT (E.). Le typhus bénin ou maladie de Brill est une infection endémique des rats parisiens (*Mus norvegicus*). [**Benign Typhus an Endemic Disease of Parisian Rats.**]—*Bull. Acad. Méd.* 1932. Mar. 8. 96th Year. 3rd Ser. Vol. 107. No. 10. pp. 356–360. [12 refs.]

The author refers to the work in America and in Greece on the same lines; his observations were made in Paris where the disease in man is not met with except for a few imported cases, whereas Greece and America are endemic areas. Rats (*Mus norvegicus*) were captured in the city and killed; emulsion of the brains injected into guineapigs produced fever and testicular enlargement typical of American typhus virus. The rat flea *X. cheopis* is rare on rats in Paris; hence few cases in man. The author considers that endemic typhus is a disease of rats exceptionally transmitted to man; and he compares the relation of typhus of the old world and Brill's disease to that of variola and vaccinia. *D. Harvey.*

NETTER (Arnold). Le typhus endémique de l'homme et du rat dans la région parisienne et l'intervention de "Xenopsylla cheopis." Développement et localisation de "Rickettsia prowazeki" dans le corps des puces. Présence du virus dans leurs déjections. Si le rôle des rats dans la conservation du virus est établi, le pou conserve le rôle primordial dans la transmission, et la lutte contre ce parasite reste la base indiscutée de la prophylaxie du typhus. [**Endemic Typhus of Man and of the Rat in the Region of Paris and the Part played by** *X. cheopis*.]—*Bull. Acad. Méd.* 1932. Mar 22. 96th Year. 3rd. Ser. Vol. 107. No. 12. pp. 408–412.

The author describes 9 cases of mild endemic typhus which were under his care in the Trousseau Hospital in Paris in the year 1916, in children convalescent from scarlet fever; there was a profuse rash which did not involve the face; all 9 made a good recovery. In one instance the blood was injected into a guineapig which developed fever; after recovery from this reaction it was shown to be immune to inoculation of Tunisian typhus virus (epidemic). Netter has no doubt that these were cases of Brill's disease and remarks that rats were seen in the ground floor ward in which the children slept.

The rest of the paper is taken up with a review of the recent work in America and Europe and the author stresses the point that cases of endemic typhus are mild and few in number because the virus is passed through the rat, and because the rat flea in the faeces of which the germs are present only in small numbers only rarely bites man; whereas in epidemic typhus the virus is passed directly from man to man by the body louse and the germ is present in the faeces of this parasite in enormous numbers. Prophylaxis against epidemic typhus is therefore founded on lousing. *D. H.*

BRUMPT (E.). Le typhus des rats sauvages du nouveau et de l'Ancien Monde est-il identique au typhus humain? [**Is Rat Typhus Identical with Human Typhus?**]—*Bull. Acad. Méd.* 1932. Mar. 22. 96th Year. 3rd Ser. Vol. 107. No. 12. pp. 416–420. [10 refs.]

Brumpt like other observers has been struck with the ease with which the "virus" of typhus can be obtained from wild rats by the intraperitoneal injection of an emulsion of the brain into guineapigs, not

only in endemic centres of the disease but also where the disease is non-existent as in Paris. He therefore puts the question—Is the typhus of wild rats identical with the human virus ?

He refers to the work of MOOSER and his co-workers in America and also to a paper by ŹOZAYA, *Jl. Infectious Diseases.* 1930, Vol. 46, p. 18. This worker inoculated a guineapig (which had already been solidly immunized against typhus) with the scrotal fluid from an infected guinea-pig containing very numerous " Mooser bodies " (Rickettsia). After an incubation period the immune guineapig developed a scrotal reaction and the scrotal fluid, which now contained numerous " bodies," was injected into other guineapigs which also gave the scrotal reaction. This fluid injected into a human volunteer gave no reaction and the Weil-Felix reaction remained negative. ŻOZAYA argues from this that the " Mooser bodies " (Rickettsia) are not the virus of typhus but represent another and distinct virus which causes the testicular swelling in guineapigs. Brumpt also refers to the recent work of NICOLLE [below] which showed that the injection of an emulsion of the brain of normal guineapigs into guineapigs and rats produced swelling of the testicle and caused the appearance of Rickettsia-like bodies. In view of these findings Brumpt declares that further research is necessary before we can consider the rats of Europe as reservoir of the virus of typhus. Two things at least require explanation—Why is it that when an emulsion of the brain of rats is inoculated into guineapigs not only fever but also testicular swelling (Mooser reaction) almost invariably appears, whereas the inoculation of the blood of cases of typhus fever, either mild or grave, in male guineapigs, only results in fever ? Another curious thing is the frequency with which this rat virus reaction in guineapigs appears in Europe ; in America out of 81 rats examined MOOSER only found two carriers of the virus, yet in Toulon, Greece and Paris, from 50 to 100 per cent. of the rats were found to be infected. In this connexion it should be remembered that in the laboratory the typhus virus is only viable in rats and guineapigs for about 10 days. In view of the impossibility of foretelling the result Brumpt does not suggest the inoculation of man with the rat virus but the blood of cases of endemic typhus might be injected into a large series of guineapigs to see if the " Mooser reaction " develops. *D. H.*

NICOLLE (Charles) & LAIGRET (Jean). Présence d'une bactérie, analogue aux *Rickettsia,* dans la tunique vaginale des cobayes et des rats, inoculés par voie péritonéale avec des produits non virulents. [**A Rickettsia-like Organism in Tunica Vaginalis of Rats and Guineapigs inoculated Intraperitoneally with Non-Virulent Substances.**]—*C. R. Acad. Sci.* 1932. Mar. 7. Vol. 194. No. 10. pp. 804–807.

MOOSER noted that in guineapigs inoculated with the virus of Mexican typhus very numerous Rickettsia bodies could be demonstrated in the swollen tunica vaginalis ; he stated also that the material which contained the greatest number of Rickettsia was the most virulent inoculum for other animals. The authors failed to correlate the number of Rickettsia with the virulence of the inoculum ; in some cases the germs were very numerous, in other cases few and in others none could be seen, and yet the material in their hands proved

equally capable of producing infection. They inoculated normal guineapigs intraperitoneally with normal brain tissue and phosphate of calcium separately and mixed, and were astonished to find in the tissues of these animals numerous Rickettsia like bodies indistinguishable from those seen after inoculation with typhus virus. The suggestion is made that these bodies are already present in the animals and the inoculation of brain tissue and phosphate causes a multiplication.

D. H.

Lépine (P.), Caminopetros (J.) & Pangalos (G.). Présence du virus du typhus exanthématique chez les puces des rats d'Athènes et du Pirée. [**Presence of Typhus Virus in Rat Fleas of Athens and Piraeus.**]—*C. R. Soc. Biol.* 1932. Mar. 11. Vol. 109. No. 9. pp. 710–712.

Rats were captured in various parts of Athens and Piraeus and the fleas collected, counted and identified; usually 2 to 6 were found per rat. Some of the fleas were dissected and stained to demonstrate Rickettsia; the remainder were ground up, emulsified and injected intraperitoneally into guineapigs. These animals developed fever after an incubation period of 4 to 5 days. The authors noted that the reaction after injection of the emulsion of fleas was much more marked than after that of brain and blood of rats and this suggests a multiplication of the virus in the flea. It was found that if more than 12 fleas were employed infection invariably resulted and as few as 2 *X. cheopis* produced an infection. This flea is the most heavily infected and also the most common (96 per cent.) of the rat fleas.

D. H.

Lépine (Pierre). Existence, en Grèce, d'une forme endémique du typhus exanthématique. Rôle du rat et des puces comme réservoir et vecteurs de cette affection. [**Endemic Typhus in Greece. Rats and Fleas as Reservoirs and Vectors.**]—*Bull. Acad. Méd.* 1932. Apr. 12. 96th Year. 3rd Ser. Vol. 107. No. 14. pp. 495–499.

The author believes that endemic typhus is fairly common in Greece but is confused clinically with eruptive fever and epidemic typhus, the severe cases being called typhus and the mild cases, especially if there is a rash on the hands and feet, eruptive fever ("fièvre boutonneuse").

He describes two cases; in one the blood inoculated into volunteers did not infect, but numerous rats were found in the patient's bedroom; some of these were caught and killed and emulsion of the brains was inoculated into guineapigs; these animals gave the typical reaction of Brill's disease. Fleas of the species *X. cheopis* collected from the rats and injected into guineapigs gave the same reaction. In the other case the blood of the patient inoculated into guineapigs gave the typhus reaction (Brill's) and these animals were subsequently shown to be immune to the local (Athens) virus and also to a strain of true typhus virus.

D. H.

Lépine (P.) & Caminopetros (J.). Action, sur le virus exanthématique des rats d'Athènes, du sérum de malades guéris du typhus exanthématique et de la fièvre boutonneuse. [**Action on the Typhus Virus of Athens Rats of Serum of Convalescents from Typhus and Eruptive Fever.**]—*C. R. Acad. Sci.* 1932. Apr. 11. Vol. 194. No. 15. pp. 1277–1280.

A guineapig was infected with the strain of typhus virus obtained from rats in Athens. The brain was removed and emulsified and one portion mixed with normal serum and another portion with the serum of persons recovered from epidemic or true typhus; after ½ hour contact the mixtures were inoculated into other guineapigs. The guineapigs inoculated with the virus+normal serum both reacted but neither of the two inoculated with virus+typhus convalescent serum. These two animals were subsequently reinoculated with Athens virus; one reacted, the other did not, the inference being that in one case the serum (convalescent) had completely neutralized the virus, and in the other only partially. In a second experiment the local virus was treated with (1) normal serum, (2) serum of convalescents from Brill's disease (endemic typhus), (3) serum of convalescents from eruptive fever. Sera 1 and 3 had no effect on the virus whereas the serum of convalescents from the local endemic typhus neutralized it. *D. H.*

Lépine (P.). Présence du virus du typhus exanthématique dans l'encéphale des rats capturés à Beyreuth. [**Presence of the Typhus Virus in Brains of Rats captured in Beirut.**]—*C. R. Soc. Biol.* 1932. Apr. 15. Vol. 109. No. 12. pp. 1072–1073.

The author obtained rats from Syria (Beirut) where there was a camp of Armenian refugees in which many cases of Brill's disease had occurred. In February 1932, 14 rats were received at the laboratory; 7 *M. decumanus* were killed and their brains emulsified and injected intraperitoneally into guineapigs. These animals reacted with fever and intense testicular swelling and oedema. They were then killed and cultures of all the organs proved to be sterile. Rickettsia were demonstrated in smears of the tunica vaginalis. Seven *M. alexandrinus* from the same batch or rats were likewise killed, the brains emulsified and injected into two guineapigs; one of these animals which reacted and recovered was shown to be immune to injection of the Athens typhus (endemic virus); the other animal which had not reacted was later shown to be susceptible to this virus. *D. H.*

Des Essarts (J. Quérangal). Présence d'un virus exanthématique sur les rats d'un navire de guerre, au Port de Brest. Rats et puces des rats à Brest. [**Presence of Typhus Virus in the Rats on a Man-of-War in the Harbour of Brest.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 283–286.

Two cases of "ship typhus" occurred at Brest on board a cruiser laid up in harbour there for one year after a long stay at Toulon. A search for the virus was carried out on the lines of Mooser and Neill in America. Rats on board the cruiser, on shore and on other ships were caught and examined; of the rats caught on the cruiser 79 per cent. were *M. rattus*, 18 per cent. were *M. norvegicus*, 3 per cent. were *M. alexandrinus*; whereas of the rats captured on shore 60 per cent. were *M. norvegicus*, 38 per cent. were *M. rattus*.

Of the rats whose brains were injected into guineapigs positive results, fever and testicular reaction, were obtained with specimens of *M. rattus* captured on the cruiser, whereas rats captured on shore and on other ships gave negative results. *D. H.*

Marcandier & Pirot (Robert). Transmission de l'homme au cobaye (après passage par le rat) du virus typhique toulonnais (typhus endémique bénin des navires de guerre). [**Transmission of the Virus of Endemic Typhus from Man to the Guineapig after Passage through the Rat.**]—*C. R. Acad. Sci.* 1932. May 9. Vol. 194. No. 19. pp. 1693–1694.

The blood of a patient suffering from mild typhus on board a ship in Toulon harbour was taken at the height of the fever and injected into a rat. This animal developed fever and was killed, the brain was removed and emulsified and injected into a male guineapig which duly developed fever and typical swelling of the testicle. This human virus was later shown to protect guineapigs against the virus obtained from rats on the same ship. *D. H.*

Dyer (R. E.), Workman (W. G.), Badger (L. F.) & Rumreich (A.). **Typhus Fever. The Experimental Transmission of Endemic Typhus Fever of the United States by the Rat Flea** *Ceratophyllus fasciatus.*—*Public Health Rep.* 1932. Apr. 22. Vol. 47. No. 17. pp. 931–932.

A few fleas, *Ceratophyllus fasciatus*, collected from rats trapped in Savannah were placed in a glass box in which was a clean white rat on which they fed and bred. Twelve of these fleas were taken, emulsified and injected into two guineapigs without any result, *i.e.*, they were non-infective. Three rats previously infected with the virus of endemic typhus were then placed in the box and the fleas fed on them. Later 5 fleas were removed and injected into 2 guineapigs; both reacted typically and the virus was passed in series and identified by the following criteria :—

1. Production of fever and testicular swelling in guineapigs.
2. Blood cultures of guineapigs taken during fever, sterile.
3. Intracellular Rickettsia present in smears from tunica vaginalis of guineapigs.
4. Typical histopathological changes discovered in brains of inoculated guineapigs.
5. Development of Weil-Felix reaction in sera of rabbits inoculated with the virus.
6. Successful crossed immunity tests.

Conclusion—*Ceratophyllus fasciatus* is a carrier of the virus of Brill's disease. *D. H.*

Dyer (R. E.), Workman (W. G.), Ceder (E. T.), Badger (L. F.) & Rumreich (A.). **The Multiplication of the Virus of Endemic Typhus in the Rat Flea** *Xenopsylla cheopis.*—*Public Health Rep.* 1932. Apr. 29. Vol. 47. No. 18. pp. 987–994.

These workers have shown that the virus of endemic typhus is present in rat fleas and in the faeces of such fleas, and that the virus is not transmitted to the egg or larva; they have failed to produce infection by the bite of the flea. In the present work 100 young fleas hatched from eggs of typhus infected fleas were placed in Box 9.

Eighteen of these fleas were taken, emulsified and injected into 2 guinea-pigs—no reaction. Again 27 more were taken and injected with a like negative result; it was therefore concluded that the remaining fleas in the box were non-infective. Two months later 200 fleas were taken from Box 9 and placed in Box 17; 3 infected rats were placed in this box for 24 hours and then removed and killed and placed with the accompanying fleas in Box 17 A. Sixteen of these fleas were taken and emulsified and injected into a clean rat: this procedure was repeated day by day until the 8th day after the infecting feed. In this first experiment it was noted that the incubation period in the inoculated rats became shorter after the first 2 or 3 days but too many fleas had been used as it was found that an amount of emulsion equivalent to $\frac{1}{50}$ of a flea would infect. Accordingly a second experiment on the same lines was carried out but only 8 fleas were taken each day; these were emulsified and the emulsion diluted so that the equivalent of $\frac{1}{2}$, $\frac{1}{8}$ or $\frac{1}{32}$ of a flea could be inoculated. Later on as little as $\frac{1}{8000}$ of a flea was used. The results are displayed in tabular form and show that one day after the infecting feed $\frac{1}{2}$ of a flea fails to infect whereas $\frac{1}{32}$ of a flea will infect later. Apparently the multiplication of the virus which takes place in the flea reaches its maximum about the 5th to 6th day after the first infecting feed; 40 days after this feed $\frac{1}{128000}$ dilution gave a positive result. The strain of virus obtained in this way was identified by the usual criteria. *D. H.*

Dove (Walter E.) & Shelmire (Bedford). **Some Observations on Tropical Rat Mites and Endemic Typhus.**—*Jl. Parasitology.* 1932. Mar. Vol. 18. No. 3. pp. 159–168. With 5 plates. [11 refs.]

The authors had previously studied the tropical rat mite in relation to a case of dermatitis in man caused by its bite. In view of recent work on Brill's disease which has shown that the virus of the disease can be carried by insect parasites of the rat, the authors have conducted a series of experiments with the tropical rat mite. They found that if rat mites are fed on infected guineapigs and emulsified and injected into non-immune guineapigs intraperitoneally these develop fever and scrotal swelling and Rickettsia can be demonstrated in the tunica. Also clean mites were fed on infected guineapigs and then at varying intervals fed on other guineapigs; some of these animals developed fever but not scrotal swelling; when, however, the blood of these animals was injected into others fever developed and also scrotal swelling and Rickettsia could be demonstrated. It is evident then that the virus of the disease can be carried from guineapig to guineapig by injection of the mites as well as by their bites. Guineapigs which recovered from fever were shown to be immune to injection of the typhus virus. As the rat mites require four blood feeds in the course of their development and leave the host after each feed and are known to bite man, it is possible that they may carry the disease from rat to man. *D. H.*

Monteiro (J. Lemos). Typho exanthematico de S. Paulo. X. A *Rickettsia brasiliensis* e suas relações etiologicas com a infecção. [*Rickettsia brasiliensis* **as the Cause of S. Paulo Typhus.**]—*Brasil-Medico.* 1932. Apr. 23. Vol. 46. No. 17. pp. 385–390. [13 refs.]

The author carried out a large number of inoculations of the virus of the S. Paulo type of typhus (using the blood or emulsion of the brain of

infected animals) into guineapigs, to determine, if possible, the aetiological relationship between the Rickettsia and the disease.

After injection he killed and examined in all 212 animals: Among 21 killed before the onset of fever, *i.e.*, 3–4 days after inoculation, he found Rickettsia present in 15 (71·4 per cent.); on the first day of fever in 5 out of 5, on the second day 30 out of 32 (93·7 per cent.), on the third 38 out of 42 (90·4), on the fourth 28 out of 40 (70); after the fourth day or on the day of natural death after that interval in 40 out of 72 (55·5). Eight were killed and examined during convalescence or several days after the temperature became normal; none of these was positive. Altogether the Rickettsia were seen in 156 of the 212, or 73·5 per cent. and the proportion of positives fell from 100 per cent. (5 out of 5) on the first day of fever to 70 on the fourth and 55·5 later in the fever, disappearing in convalescence.

After inoculation of the virus into the anterior chamber of the eye the Rickettsia were found in the endothelial cells of Descemet's membrane; after intraperitoneal inoculation, in the endothelial cells of the peritoneal wall. These cells containing the bodies, after repeated washing and centrifuging, when injected into fresh guineapigs again set up the disease, while a vaccine prepared from them is capable of producing immunity by the formation of viricidal antibodies.

H. H. S.

Pijper (Adrianus) & Dau (Helen). **Cross-Immunity between South African Typhus and Tick-Bite Fever.**—*Brit. Jl. Experim. Path.* 1932. Feb. Vol. 13. No. 1. pp. 33–35. With 1 text fig.

The virus of South African typhus (a mild form of typhus not carried by lice) produces regularly a febrile reaction in guineapigs; animals which have reacted are immune to further inoculations of the same virus. The virus of "tick-bite fever" produces a febrile reaction in guineapigs although not so regularly as does the typhus virus; animals which have reacted to tick-bite virus are immune to further injections of the same virus.

Animals which had reacted to typhus virus were found to be immune to injections of the virus of tick-bite fever; but on the other hand animals which have reacted to the virus of "tick-bite fever" were not immune to injections of typhus virus. *D. H.*

Kemp (H. A.). **Active Immunity to Endemic Typhus Fever as Produced by Formolized Infected Tissue.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Jan. Vol. 29. No. 4. pp. 353–355. [3 refs.]

Formolized tunica prepared according to Zinsser's method and administered intraperitoneally in 4 weekly doses of 1 cc. each to non-infected guineapigs brought about in test animals immunity to at least 200 times enough virus to cause a scrotal reaction in 4 days. But it would appear that this immunity is not lasting and its production is accompanied by marked reaction to the relatively large quantities of vaccine substances employed. The vaccine retains its potency only for a short time. *D. H.*

Sato (Kiyoshi). Dauerkultur von Fleckfiebererregern in Vitro. [**Continuous Culture of the Germ of Typhus Fever.**]—*Trans Japanese Path. Soc.* 1931. Vol. 21. pp. 466–470. With 1 plate.

Nagayo and his co-workers injected typhus virus into the eyeball of rabbits and reported that they found Rickettsia in the endothelial cells. The author repeated this work but was unable to demonstrate the organisms in the cells, but only contaminating bacteria; but by employing the cells of Descemet's membrane for culture inoculum he has been able to produce a continuous culture of the virus, and the virulence of this culture was proved by injection into animals.

Method of culture.—The heart blood of an infected guineapig was drawn off and centrifuged and 0·3 cc. of the leucocytic layer was injected into the anterior chamber of the eye of a normal rabbit; after 1 or 2 days the eyeball was extirpated and portions of the endothelial layer of Descemet's membrane carefully removed; small portions of this infected membrane were mixed with small pieces of fresh normal membrane and placed in a slide chamber on a medium consisting of 1 part normal aqueous humor, 4 parts rabbit plasma. The plasma coagulates and two or three drops of aqueous humor are added. The culture is then incubated at 37°C. for 2 days and later at 30°C. for 8 days. When subcultures are made it is necessary to add small portions of fresh normal endothelial layer of Descemet's membrane as living cells are essential for multiplication of the germs. The virulence of the culture is tested by injection of 0·2 cc. of the fluid into guineapigs, either intracerebrally or intraperitoneally. A positive result was shown by fever and a monocytosis in the blood and the discovery of typhus nodules in the brain and liver of the guineapigs.

Method of demonstrating the Rickettsia.—Endothelial tissue which had been cultured for 4 days was taken, spread on a slide and thoroughly dried. This slide was first treated with Loeffler's mordant for flagella staining, then deeply stained with Wolbach's fuchsin.

Basic fuchsin	0·5
Phenol	1·0
Anilin	0·5
3 per cent. alcohol ...	100·0

The preparation was then washed in formalin and differentiated with picric acid solution.

The author considers that this method is much superior to Giemsa's stain as the latter shows up many granules in the cell protoplasm which confuse the picture. By the fuchsin method a study of the morphology of the organism is possible. *D. H.*

Kodama (M.), Takahashi (G.) & Kohno (M.). **Natural Hosts and Disseminators of** ***Rickettsia manchuriae*** **(a Preliminary Note).**—*Kitasato Arch. Experim. Med.* 1932. Feb. Vol. 9. No. 1. pp. 84–89.

Manchurian typhus is a mild sporadic form of typhus and the authors classify it with Brill's disease. They have already described a Rickettsia as agent. They refer to the researches of various workers in America, Mooser, Dyer, et al., and have carried out work in their district on similar lines. They selected two towns each with 15,000 Chinese inhabitants, in which about 500 cases of typhus had occurred in 1928. 240 rats were trapped and killed and the fleas removed, counted

and identified, and utilized for inoculation purposes. Emulsions made of the brains of the rats were injected intraperitoneally into male guineapigs. Emulsions were also made of batches of fleas and injected into the testicular parenchyma of other guineapigs.

Results.—Of the 240 rats 16 gave a positive result in the guineapigs, demonstrated by fever and testicular swelling; the virus was also passed in series to other animals. The predominant species of flea found were *X. cheopis* and *Ceratophyllus anisus*; the former was the more numerous and positive results were obtained by inoculation of emulsion of batches of this flea but not with C. *anisus*. Rabbits inoculated with strains of this virus developed a positive Weil-Felix reaction in their serum. *D. H.*

Hoshizaki (Soyo). **On the Tissue Cultivation of the Virus of the So-called Manchurian Typhus Fever.**—*Kitasato Arch. Experim. Med.* 1932. Apr. Vol. 9. No. 2. pp. 155–170. With 4 charts in text & 2 figs. on 1 plate.

Small portions of the tunica vaginalis of guineapigs infected with the virus of Manchurian endemic typhus were taken and many Rickettsia were demonstrated in the epithelial cells and also some free in the plasma. The minimum infective dose of this tissue was ascertained by experiment and a portion containing 10 such units was employed for tissue culture. After ten days in the culture fluid the piece of tissue was removed for examination as to number of Rickettsia and also for injection into guineapigs. It could be readily observed that the number of Rickettsia had increased at least 100 times and the number of infective units to the same degree. Subculture was also attempted by the following method: portions of normal tissue (tunica) were placed in the plasma culture along with the piece of infected tissue. These normal " pieces " were twice the size of the infected " pieces." At the end of 10 days the normal piece was removed and cut in half, one portion being used for test and the other portion being used as infective " piece " to carry on the culture, a new normal piece being added to it. By this method Rickettsia could be demonstrated in the normal pieces to the 3rd generation and these were also infective; at the 5th generation Rickettsia could no longer be seen but the piece was infective. Apparently the virus could be cultured in series although the virulence and the number of Rickettsia did not run parallel. *D. H.*

Kodama (Makoto), Takahashi (Kensaburo) & Kono (Michio). **On Experimental Observation of the So-called Manchurian Typhus and its Etiological Agent** (*Rickettsia manchuriae*).—*Kitasato Arch. Experim. Med.* 1932. Apr. Vol. 9. No. 2. pp. 97–133. With 2 charts in text & 9 figs. on 2 plates. [31 refs.] [Summary appears also in *Bulletin of Hygiene*.]

Clinically there are two types of typhus in Manchuria, true typhus (epidemic louse borne) and endemic typhus or Brill's disease. In the present investigation the authors employed 4 strains of the virus of Manchurian typhus (endemic) M.T.V. and 2 strains of true typhus virus (epidemic) T.T.V. When guineapigs are inoculated with these viruses the febrile reaction is much the same in both and there is also loss of weight and a monocytosis but in guineapigs inoculated with Manchurian virus (endemic) M.T.V. the Neill-Mooser reaction, N.M.R., is produced, that is, redness and oedema of the testicles; this does not

occur in animals inoculated with true typhus virus T.T.V. This reaction, N.M.R., develops quickly, reaches the maximum quickly and quickly disappears. Histologically another difference can be made out ; if guineapigs which have reacted to T.T.V. are killed and the brain examined numerous " typhus nodules " will be readily found whereas in animals inoculated with M.T.V. only a few nodules or none may be seen. Crossed immunity experiments in guineapigs are positive with M.T.V. and T.T.V. Rabbits inoculated with M.T.V. give the Mooser reaction and also their serum gives a positive Weil-Felix reaction ; in white rats also fever and slight swelling of the testicle is noted but not the positive Weil-Felix reaction.

The authors have also found that very occasionally swelling of the testicle may be noted in guineapigs after inoculation with T.T.V. but this reaction is not in any way comparable to that produced by the virus of Brill's disease and this property of the latter virus is not altered by passage through mice or white rats. The authors demonstrated the Rickettsia in the tissues of inoculated animals especially in the tunica vaginalis of animals inoculated with M.T.V. and a full description of the morphology and staining reactions of these organisms is given. A few Rickettsia were noted also in the spleen of guineapigs but not elsewhere in the tissues. If testicular swelling is produced by injection of true typhus virus Rickettsia can be found in the tunica vaginalis but never in such large numbers as are found after injection of the virus of M.T.V. The authors conclude that the *R. manchuriae* is similar to *R. prowazeki* although it differs somewhat in the effect it produces on inoculation into animals. *D. H.*

Kodama (Makoto), Kono (Michio) & Takahashi (Kensaburo). **Demonstration of *Rickettsia manchuriae* appearing in the Stomach Epithelial Cells of Rat Fleas and Rat Lice infected with So-called Manchurian Typhus.**—*Kitasato Arch. Experim. Med.* 1932. Apr. Vol. 9. No. 2. pp. 91–96. With 4 coloured figs. on 1 plate.

Wild rats were captured in Dairen, Manchuria, and lice and fleas collected from them. These rat lice and fleas were fed on rats which had been infected with the virus of Manchurian typhus (Brill's disease), and smear preparations and sections were made from the stomachs of these insects. Amongst the wild rats captured two carriers of the virus were discovered and in 3 *cheopis* fleas obtained from these rats Rickettsia were demonstrated in the epithelial cells of the stomach. Rickettsia also were readily discovered in the epithelial cells of the stomach of fleas which had been fed on rats experimentally infected with the virus ; in addition a white rat was infected and lice collected from it showed Rickettsia ; these findings are well illustrated in coloured plates. Control lice and fleas fed on normal rats were uniformly negative for Rickettsia. *D. H.*

Mukerji (D. M.). **Cases of Tick-Typhus in a Town.**—*Indian Med. Gaz.* 1932. Feb. Vol. 67. No. 2. pp. 86–87. With 1 text fig.

Three cases of tick typhus which occurred in the city of Nagpur are described. The rash was typical and there was also conjunctivitis and sleeplessness. The Weil-Felix reaction was negative in all. In one case the patient stated that he had removed a tick from his arm 17 days before the fever commenced. *D. H.*

KIRSCHNER (L.) & KUIJER (A.). Diagnostiek en kliniek van tropical typhus. [**Diagnosis and Symptoms of Tropical Typhus.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Feb. 2. Vol. 72. No. 3. pp. 153–164. [38 refs.] English summary.

Fifty-two cases of tropical typhus were observed by the authors in Java, 25 in Europeans, 20 in natives and 7 in Chinese. All the patients gave a positive Weil-Felix reaction with Proteus X_{19} in the O form in a titre of over 1/200. 1,400 controls were carried out in other fever cases and with normal bloods; all were negative. The authors found that suspensions of living bacilli were best for the test and alcohol treated bacilli next. Clinically the cases were typical, not severe, with maculo-papular rash, face red, eyes congested and absence of rash on the mucous membrane of the mouth; the mortality was low. *D. H.*

KAWAMURA (Rinya) & IMAGAWA (Yoso). Aetiologische Studien ueber Rocky-Mountain Spotted Fever. [**On the Cause of Rocky Mountain Spotted Fever.**]—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 472–476. With 2 figs. on 1 plate.

The author received a number of infected ticks from Dr. PARKER of Montana. Some of these ticks were fed on guineapigs and some were emulsified and injected into guineapigs; all these animals reacted with the specific symptoms of the fever. Blood, omentum, testicle and brain were taken from these guineapigs and injected into others into brain, peritoneum, testicle and muscle; all gave positive results. Redness and swelling of the testicle was noted and in the later stages gangrene of the organ. For microscopical examination fixation by Rigaud's method and staining by Giemsa were employed; Rickettsia in large numbers were seen in the muscle cells of the middle coat and in the endothelial cells of the blood vessels of the testicles and tunica vaginalis, but not in the endothelial cells of Descemet's membrane or in the omentum. Rickettsia were also found in certain large cells in the brain substance.

Two points of difference between *R. rickettsia* and *R. orientalis* were noted. The first is found in the cells of the walls of the blood vessels, the latter in the reticulo-endothelial system. *R. rickettsia* is a diplobacillus or bacillus whereas *R. orientalis* is pleomorphic. *D. H.*

FISHER (L. C.). **Chemotherapy of Experimental Spotted Fever.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Feb. Vol. 29. No. 5. pp. 633–635. With 1 text fig.

The strain of virus used in these experiments was derived from a patient in Minnesota—an exceptionally mild type of Rocky Mountain Fever. The animals used were guineapigs and the usual course of the fever after inoculation was carefully studied in these animals. The drugs employed were Germanin (Bayer 205), metaphen, triphal (an organic gold compound) and tryparsamide; suitable doses of these drugs were injected on the first day of fever but none had any effect on the temperature curve in the experimental animals. *D. H.*

NAGAYO (Mataro), SATO (Kiyoshi), MIYAGAWA (Yoneji), MITAMURA (Tokushiro), TAMIYA (Takeo) & HAZATO (Hikozaemon). Ueber die Kultur des Erregers der Tsutsugamushi-Krankheit, *Rickettsia orientalis*, unter Anwendung der Gewebezüchtungsmethode. [**Culture of the Germ of Tsutsugamushi Fever and the Use of the Tissue Culture Method.**]—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 411–425. With 18 figs. on 4 plates & 5 text figs. [Refs. in footnotes.]

It is now generally agreed that *Rickettsia orientalis* is the cause of this disease. This has been specially confirmed by the development and multiplication of the Rickettsia in the anterior chamber of the eye of rabbits inoculated with the virus of the disease. It had been noted that in infected animals the parasite multiplied within the cells of the tissues and specially in the endothelial cells of Descemet's membrane ; therefore tissue culture naturally suggested itself as a useful line of research. It had also been shown that the Rickettsia retain their vitality for some weeks in plasma culture from the infected testicles of rabbits and also there was definite evidence of multiplication of the germ in such cultures. Other workers have utilized lung and spleen as the tissue for culture. The authors have employed as tissue of choice the endothelial cells of Descemet's membrane taken from the eye of normal rabbits ; such cells multiply in culture and are the site of selection for the Rickettsia in the infected animals.

Rabbit plasma was used as the culture medium and several strains of virus obtained from human cases of the fever were employed ; these strains had been shown to be virulent for rabbits and monkeys. The cultures were made as a rule in hanging drop cells as these could be readily observed under the microscope, and the culture mixture was made as follows—3 drops of the fluid from the anterior chamber of the eye of a normal rabbit + a small piece of the germ-free endothelium of Descemet's membrane + 0·5 cc. of rabbit plasma. The inoculum was either a few drops of aqueous humor from the eye of an infected rabbit or a portion of the membrane from the same eye ; the whole is well mixed and ringed with paraffin and incubated at 37°C. for two days, and subsequently at 30°C. for the remainder of the time ; for subculture a few drops of the mixture is carried over to a new culture medium. The duration of the culture was usually about ten days. In four days multiplication of the Rickettsia could as a rule be seen, but the maximum was not reached till about the 7th day. In the primary culture development was slower, but the parasites could usually be observed, plentifully by the 14th day ; it was therefore necessary to use as inoculum heavily infected fluid or tissue.

For purpose of observation the best method is to remove some of the cell mass and to fix and stain this for examination. The *Rickettsia orientalis* will be found very numerous in some of the new cells ; not all cells are infected, some may show only a few parasites and others may be crammed with Rickettsia. A few of the parasites may also be observed free in the plasma, also degenerated forms may be seen along with degenerated cells. The typical Rickettsia have the usual morphology, diplococci and bipolar forms, and stain readily with Giemsa. The results of animal experiments are shown in tabular form. Strain I was passed through 11 culture generations ; each generation was tested and found to be infective for rabbits and monkeys ; these animals after recovery were shown to be immune to subsequent

injections. Strains II, III and IV were also tested in a similar fashion and shown to be infective. The period from first isolation to the 11th generation was 89 days. *D. H.*

KIMURA (Ren), FUJISAWA (Yosio) & MISUGI (Yositosi). Studien ueber die Tsutsugamushikrankheit in der Gewebezüchtung. [**Tissue Culture in Tsutsugamushi Disease.**]—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 426–431. With 2 figs. (1 coloured) on 1 plate.

The authors had already done similar work in dealing with vaccinia virus in tissue culture, using testicle, lung, kidney and spleen of rabbits. They therefore decided to carry out research with the virus of Japanese River fever. The strain utilized was obtained from Professor OGATA. The tissue used for cultural purposes was small portions of the testicle, lung and spleen of normal rabbits and these were injected in vitro ; the material for the culture medium was the plasma and spleen extract of the same animal. The strain of virus utilized was highly virulent and rabbits were readily infected by injection into the eyeball or testicle. The tissue employed for culture was placed in Tyrode's solution and then emulsion of an infected testicle was mixed with it, two or three pieces of this tissue were then added to the spleen extract, plasma medium described above and left in the incubator for one week. When there was good growth of the tissue cells these were divided into two portions, one portion was removed for examination and the other used for secondary culture. The supernatant fluid was injected into the testicle and anterior chamber of the eye of rabbits, a positive result being recorded after microscopical examination of the testicle, and the appearance of typical iritis in the eye. The portion of tissue removed from the culture was also fixed and stained for microscopical examination and in positive cases numerous *Rickettsia orientalis* could be seen as they were also in the cells of the testicle and endothelial cells of Descemet's membrane in injected animals. The results of the culture experiments are given in tabular form. The 1st table refers to cultures in which the rabbit's testicle was used, the 2nd those in which lung tissue, and the 3rd the spleen tissue ; in all 3 series the virulence of the virus was tested in all generations of the cultures up to 10 and in all it remained the same. The total period from the commencement of the experiment was 72 days ; subcultures were made once a week and all 3 tissues gave the same positive results. *D. H.*

NISHIBE (Masujiro), MIYAZAWA (Masae) & HOSONO (Sichiro). **The Multiplication of Rickettsia Orientalis, the Virus of Tsutsugamushi Disease, in Tissue Cultures.**—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 431–440.

It has been proved that the virus of tsutsugamushi disease remains alive in plasma for at least 29 days if subcultured every 5 days ; and the Rickettsia have been shown to multiply by microscopical examination. Two strains of the virus were utilized in this research and the material for inoculation was the infected testicle of rabbits ; cultures were made in Carrel flasks and the medium employed was made up of 2 parts rabbit heparin plasma, 1 part chick embryo juice, in Tyrode's solution, and the whole was incubated at 38°C. Estimations were made of the number of Rickettsia in a portion of the original inoculum,

and the numbers present after incubation in the culture for ten days. Small pieces of the infected testicle were emulsified in Tyrode's solution and the emulsion was diluted 5, 10, 100 and 1,000 times and 0·4 cc. of each dilution was injected into the testicles of normal rabbits. In the same way small pieces of the same infected testicle which had been cultured and incubated for 10 days were removed and emulsified and diluted and 0·4 cc. injected. The minimum amount of the emulsion which caused definite orchitic lesions in the rabbit's testicle was taken as the tsutsugamushi unit or t.u. Using this method it was shown that the Rickettsia content of the emulsion had increased 100 times in ten days. *D. H.*

Nishibe (Masujiro), Hosono (Sichiro) & Miyazawa (Masae). **A New Method for the Demonstration of the Virus of Tsutsugamushi Disease.**—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 441–448. With 4 figs. on 1 plate.

The authors consider that the difficulty of demonstrating *R. orientalis* in the tissues of animals is mainly due to the scarcity of the organisms, as they are readily and clearly stained by Giemsa's stain. These organisms have been shown to be contained in the histiocytes in the testicle and skin and in the endothelial cells of Descemet's membrane but not in lymphocytes or red cells but may be found in other phagocytic cells.

Two strains of virus were used in the authors' research and the material used for injection was emulsion of infected testicle in Ringer's solution ; 3 cc. of this emulsion were injected *intratracheally* into normal rabbits. These animals were killed at intervals by means of air embolus and were examined, smear preparations being stained by Giemsa's stain and sections by haematoxylin and eosin. Focal pneumonia of the lower lobes of both lungs was found ; on microscopical examination after the 5th or 6th day the alveoli of the lungs were found to be filled with large numbers of mononuclear cells (histiocytes) and also alveolar epithelial cells. *R. orientalis* was found in large numbers in these cells but especially in the epithelial cells, which were crammed with these organisms. Control experiments ; normal lungs and lungs inoculated with normal testicular emulsion were examined, but nothing resembling the above picture was noted. Cultures were made on ordinary media but only a few cocci were isolated. 10 per cent. emulsions were made of the lungs of infected rabbits and injected into the eye and testicle of rabbits ; orchitis and iritis were typically produced in all the animals ; 0·5 cc. of the emulsion was injected into the testicle and 0·1 cc. into the anterior chamber of the eye. *D. H.*

Hayashi (Naosuke). **On Tsutsugamushi Disease.**—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 448–451.

Hayashi refers to the identification of the causative organism of tsutsugamushi fever. As regard morphology it is polymorphic, showing specially coccal and diplococcal forms. Special "thread" forms (spirilla) have been described in *R. prowazeki* but not so far in *R. tsutsugamushi*, but the author showed a film of blood demonstrating a thread form and also ring forms of the parasite. These organisms occur as a rule intracellularly and generally in endothelial phagocytic cells (histiocytes) but the author declares that they may also be found

in lymphocytes. He also refers to the recent discovery of Rickettsia in mites by KAWAMURA, and he points out that there are many varieties of mite, but so far only one has been proved to carry the disease, and Rickettsia can be found in all ; just as is the case in typhus in lice in epidemic and non-epidemic areas. As regards nomenclature he suggests *R. tsutsugamushi* new genus new species. For prophylaxis the use of inoculations of " Koktigen " and serum have been attended with success. *D. H.*

KAWAMURA (Rinya) & IMAGAWA (Yoso). Ueber die Proliferation der pathogenen Rickettsia im tierischen Organismus bei der Tsutsugamushi-Krankheit. [**The Multiplication of the Virus of Tsutsugamushi Disease in Animals.**]—*Trans. Japanese Path. Soc.* 1931. Vol. 21. pp. 455–461. With 2 figs. on 1 plate.

The authors have found that injection of emulsion of the enlarged spleen of field mice causes reaction when injected into rabbits' testicles. and also that Rickettsia can be found in the salivary glands of mites removed from these field mice with enlarged spleen. Rickettsia have also been seen in small numbers in the blood and lymph glands of subjects of the disease and also in the bone marrow of infected guineapigs ; they have specially been noted in the lymph glands draining the area of the site of the primary sore or mite bite, or site of injection in animals, but in all these places the number of the organisms is small and therefore they are difficult to identify. As there are many histiocytes and endothelial cells in the omentum and mesentery and it is in these cells that Rickettsia are chiefly found, the authors decided to inoculate animals intraperitoneally with a view to the ready identification of the parasite and diagnosis of the disease. The results are given in tabular form. Animals were killed at varying intervals and the day on which Rickettsia appeared in the cells of the omentum, mesentery and mesenteric glands was noted. The order invariably was 1st omentum, 2nd mesentery, 3rd lymph glands. The parasites were most plentiful about the 7th day. Very many endothelial cells of the omentum were found filled with Rickettsia which could be readily identified. Guineapigs, rats and mice were used, but guineapigs were found to be the most useful animal. *D. H.*

HARA (Y.). Ueber die pathologisch-histologischen Veränderungen der Lymphdrüsen bei der Tsutsugamushi-Krankheit in Formosa. [**Histopathological Changes in Lymph Glands in Tsutsugamushi Fever in Formosa.**]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1932. Feb. Vol. 31. No. 2 (322). [In Japanese. German summary pp. 13–14.]

Five cases of the disease were studied and enlarged lymph glands were removed during life for examination ; these glands were situated in the area draining the site of the initial sore (mite bite). Marked changes were noted both in the medulla and cortex of the glands, and inflammatory changes in the capsule, such as round-celled infiltration, oedema, etc. Hyperplasia and hypertrophy of the reticulo-endothelium and shrinking of the follicles were noted. The occurrence and proliferation of so-called " blister cell " histiocytes was a characteristic change in all areas, and degeneration of these cells and of lymphocytes was also present. This necrosis was specially diffuse in haemorrhagic

areas in the cortex. Plasma cells were rare. These histiocytes were phagocytic and contained erythrocytes, lymphocytes and portions of necrosed cells and also granules; these cell inclusions made an interesting histological picture. *D. H.*

KAWAMURA (R.), SHIBATA (T.) & IMAGAWA (Y.). Ein Fall von Tsutsugamushi-Krankheit nach Laboratoriums-infection. [**A Case of Laboratory Infection in Tsutsugamushi Disease.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. May 6. Vol. 124. No. 5/6. pp. 355–360. With 4 text figs.

A young laboratory attendant, an Annamese aged 25, had been assisting in work with the viruses of Rocky Mountain spotted fever, typhus and tsutsugamushi disease; he was taken ill suddenly with severe headache and fever and 3 days later a rash appeared. The differential diagnosis presented some difficulty in view of the opportunity for infection with any of the three viruses and the possibility of typhoid, paratyphoid or of measles. The two latter were excluded by reason of the typical Kedani rash and the blood, urine and faeces were cultivated with negative results. On the 10th day of the fever blood was taken from the patient and injected into guineapigs; these animals were killed for examination and the virus was passed on to other guineapigs. Typical intracellular Rickettsia were demonstrated in preparations from the omenta of these animals and are shown in a photomicrograph. Guineapigs which had recovered from an attack of fever due to the virus isolated from the patient were proved to be immune to the inoculation of the laboratory strain of tsutsugamushi disease but were susceptible to the virus of Rocky Mountain spotted fever and to typhus virus; thus confirming the diagnosis. The authors refer to a previous case of laboratory infection reported by OGATA in which a needle charged with infected material was accidentally inserted into the skin of a worker who developed a primary sore at the site of the puncture with swollen glands and fever and eventually died of the disease. In the present case there was no initial sore and presence of mites could be definitely excluded; the injection of infected material could also be ruled out. The authors suggest that in the course of his work the man became infected through handling infected tissues, the virus entering through a fissure in the skin of the hands and being absorbed directly into the lymph stream. The patient made a good recovery. *D. H.*

ISHIWARA (K. Kikutaro) & OGATA (Norio). [In Portuguese & German.] Sobre o agente do "Tsutsugamushi." Ueber dem erreger der Tsutsugamushikrankheit. [**The Agent of Tsutsugamushi Disease.**] —*Rev. Med.-Cirurg. do Brasil.* 1932. Mar. Vol. 40. No. 3. In Portuguese pp. 71–75. With 6 figs. on 2 plates. In German pp. 76–81.

I. The conservation and exaltation of virulence of tsutsugamushi virus by means of passage in rabbit testicles.—The authors have shown that monkeys are susceptible to this virus and that typical symptoms, fever, initial sore at site of injection, enlarged glands, etc., are produced and that these animals after recovery from an attack are immune to further inoculations of the virus; rats and guineapigs are also susceptible but do not show any typical symptoms except enlarged spleen; rabbits had previously been but little used in this research.

In 1923 the authors showed that the blood [illegible] the testicles of monkeys produced a [illegible] later they inoculated the virus into rabbits [illegible] injection the testicle [illegible] into the testicle of another rabbit. By 1926 [illegible] tions had been subinoculated. The usual practice was to inoculate the blood of a human case of the fever into a monkey, then from the monkey into the rabbit's testicle or else from man to rabbit, then to monkey and then to rabbit. Four strains of the virus were employed. The inoculated testicles swell immediately after the injection but soon return to normal size; it removed and sectioned hyperæmia and necrosis are noted but not so severe as after inoculation with smallpox virus although much more marked than after inoculation of normal blood. Usually after 5 passages from testicle to testicle the emulsion of testicle was injected into a normal monkey and produced in this animal the typical symptoms of tsutsugamushi fever; if the animal recovers it is then immune to further inoculations with emulsion of infected testicle or rat spleen; the virus was tested in this manner to 40 passages. The blood of fever cases is usually infective for monkeys but not always so and the animals recover, but when inoculated with testicle emulsion the animals suffer from a severe attack of fever and often die, thus showing that the virulence of the virus has been exalted or that there has been a multiplication of the germ. The virus remains infective in the testicle of the same rabbit for 3 weeks but not for 4. Pieces of infected tissue when placed in culture media were shown to be sterile.

II. Increase in histiocytes and cell inclusions in them. In sections of the infected testicles if stained by Giemsa very many histiocytes can be seen; these are larger than the leucocytes and the nucleus is stained a dark blue and the protoplasm deep blue. One to three weeks after injection organisms can be seen in these cells, staining blue with Giemsa; the primary form is coccoid but in addition diplococci, rod-shaped forms with bipolar staining, longer rods and comma forms are seen that recall at once the picture of Rickettsia. These organisms are in the protoplasm of the cells, never in the nucleus. 10 days after injection they are most numerous especially the rod forms; they are more readily demonstrated by staining in smear preparations than in sections. In addition to staining with Giemsa and Löffler stain they also stain well with carbol gentian violet but not with Gram. An occasional coccus form may be seen in the lymphocytes.

This work has been confirmed by other workers in Japan but until it is possible to cultivate these Rickettsia like organisms it is not possible to say that they are actually the germs of tsutsugamushi fever. The author notes the resemblance between the cell inclusions he describes and *Bartonella muris*. *D. H.*

KAIWA (Jyuji). Untersuchungen ueber die Kedanikrankheit I. Mitteilung. Ueber die Veränderung der Blutgerinnungsfähigkeit. II. Mitteilung. Ueber den Zuckergehalt des Blutes. [**Researches on Kedani Disease. Part I. Changes in the Coagulability of the Blood. Part II. Sugar Content of the Blood.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. May. Vol. 36. No. 5. pp. 276–285. [18 refs.]; pp. 285–287. [37 refs.]

Blood was taken direct from a vein and placed in a Leitz coagulometer. Control bloods from normal people were observed at the same

time and under similar conditions. Five cases of the disease were observed. In all the coagulation time of the blood was considerably greater (double or more) than in the normal people. Also in all 5 cases there was a marked reduction in the number of blood platelets and leucocytes. In one case there was a marked reduction in the thrombin content but in the others no significant difference from the normal was noted, but the fibrinogen content was below normal in all cases; on the other hand the calcium content was equal to normal. The blood clot was softer than normal.

The sugar content was tested in the same 5 cases and did not differ significantly from the normal. *D. H.*

KRAUS (R.). Ueber den derzeitigen Stand der verschiedenen Varietäten des Flecktyphus und ihre biologische Differenzierung. [**Varieties of Typhus Fever and their Biological Differentiation.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 3/4. pp. 353–362.

A review of the recent advances in our knowledge of the group of typhus fevers. *D. H.*

NICOLLE (Charles). Nécessité de conserver le nom de fièvre boutonneuse à la maladie dénommée ainsi dès 1910 à Tunis et transmise par la tique du chien. Comprendre sous celui de fièvre exanthématique l'ensemble du groupe de maladies dont le typhus exanthématique du Vieux-Monde est le type le plus anciennement et le mieux connu. Intérêt de la recherche de l'existence de cas inapparents chez les marins de nos navires de guerre. [**Nomenclature of Eruptive Fever and of the Typhus Group of Fevers.**]—*Bull. Acad. Méd.* 1932. Mar. 1. 96th Year. 3rd Ser. Vol. 107. No. 9. pp. 292–294.

Professor Nicolle demands that the name "fièvre exanthématique" in its present significance should disappear, and that the disease in question should be known as "fièvre boutonneuse" not only on grounds of priority but also because the term "exanthématique" causes confusion with the fevers of the typhus group. The writer also suggests that the term "fièvre exanthématique" should be retained to describe the group of typhus fevers including fièvre boutonneuse, Rocky Mountain spotted fever, Mexican typhus, Malayan typhus, Japanese river fever and Brill's disease.* *D. H.*

DURAND (P.). Le chien réservoir de virus de la fièvre boutonneuse. [**The Dog as Reservoir of the Virus of Eruptive Fever.**]—*C. R. Acad. Sci.* 1932. Mar. 7. Vol. 194. No. 10. pp. 918–919.

The author considers that the failure to show that the dog is susceptible to the virus of eruptive fever is due to the fact that all dogs are immunized while they are young. He took two pups one month old, born in the winter and therefore never exposed to the bites of ticks,

*Of the names for *fièvre exanthématique*, usually designated in this *Bulletin* "eruptive fever" that of *fièvre boutonneuse* undoubtedly has priority but it is unsuitable for the non-French readers because it cannot be satisfactorily rendered in English. We can hardly speak of "bud" or "button" fever, and "macular" is inaccurate. It is to be hoped that our French colleagues will adopt a more convenient term. Meantime in this *Bulletin* we shall continue the use of "eruptive" fever. [Ed.]

and inoculated them with emulsion of 60 and 90 ticks respectively; no reaction followed but the blood of the pups taken ten days later proved to be infective for a human volunteer. The conclusion is that dogs are susceptible to the virus and act as reservoirs. *D. H.*

DURAND (P.) & LAIGRET (J.). Fièvre boutonneuse et "fièvre de Marseille." Immunité croisée. [**"Fièvre Boutonneuse" and Marseilles Fever.**]—*C. R. Acad. Sci.* 1932. Feb. 29. Vol. 194 No. 9. pp. 798–800.

—— & ——. La "fièvre de Marseille" immunise contre la fièvre boutonneuse de Tunisie. [**Marseilles Fever immunizes against "Fièvre Boutonneuse."**]—*Arch. Inst. Pasteur de Tunis.* 1932. Mar. Vol. 20. No. 4. pp. 422–425.

A large number of the nymph stage of the tick were collected in the suburbs of Marseilles; from these 200 adults emerged. These were washed thoroughly in antiseptic and emulsified and injected into M.B.S., a subject of dementia praecox. This man 5 days later developed a severe attack of fever with typical eruption; his blood taken during the height of the fever proved infective for another man. Two other men received doses of Tunisian virus derived from the brain of gerbilles; both these men developed fever. From a naturally infected case of Tunisian fever the blood was injected into a susceptible person who developed fever; his blood was at the same time inoculated into the four people, two of whom had recently recovered from Marseilles fever, and two from Tunisian fever; none of the four reacted, showing that a previous attack of Tunis fever protected from the Tunisian virus and also that a previous attack of Marseilles fever protected against the Tunisian virus. *D. H.*

DURAND & LAIGRET. Sensibilité de certains rongeurs au virus de la fièvre boutonneuse. [**Sensibility of Certain Rodents to the Virus of Eruptive Fever (Tunis).**]—*Arch. Inst. Pasteur de Tunis.* 1932. Mar. Vol. 20. No. 4. pp. 426–429. With 2 text figs.

Two gerbilles were inoculated with the blood from a case of eruptive fever (Tunis); there was no reaction; ten days later the animals were killed, the heart blood was mixed with an emulsion of the brains and inoculated into a patient. This man duly developed typical fever, and his serum later gave a positive Weil-Felix reaction. Exactly the same procedure was followed with two white rats and the same results followed. It is possible that the gerbille in the neighbourhood of Tunis may act as a reservoir of the disease. *D. H.*

DURAND (Paul). La réaction de Weil-Felix dans la fièvre boutonneuse. [**The Weil-Felix Reaction in Eruptive Fever (Tunis).**]—*Arch. Inst. Pasteur de Tunis.* 1932. Mar. Vol. 20. No. 4. pp. 395–421. With 17 charts.

The author gives an account of previous work on the Weil-Felix reaction in Tunisian and Marseilles fever and arrives at the general conclusion that so far the reaction in these diseases has been regarded as negative or doubtful.

The present studies were commenced in 1930 and continued up to the end of 1931 and concerned 9 cases of naturally infected people and 13 men experimentally infected. Two of these last were inoculated with

Marseilles virus and eleven with Tunisian. In the 13 experimental infections it was possible to examine the sera on several occasions before the inoculation and in all cases it was found to be negative. Four strains of *Proteus** were employed in the investigation, X_{19}, X_2 in the O form and XK both in O and H form. Positive reactions were obtained in all the cases with the strains X_2 and X_{19} O form but not with XK either in O or H form.

In only one case was the resulting titre not higher than 1/50; in 5 cases it reached 1/100, in 4 1/200, in 3 1/400, in 3 1/1800, in 4 1/2,000 and in 1 case 1/3,200. The more prolonged and severe the infection the higher the titre as a rule. The results are recorded in tabular form. The reaction is rarely as high as that met with in true typhus and does not appear at all during the fever but usually shows first at the end of the first week of apyrexia. Although all the cases gave a positive reaction some reacted better with X_{19} and others with X_2.

The author concludes that eruptive fever should be included among those diseases which give constantly a positive Weil-Felix reaction.

D. H.

Plazy & Germain. Un cas de fièvre exanthématique traité avec succès par le sang de convalescent de typhus. [**Case of Eruptive Fever treated by Convalescent Typhus Blood.**]—*Bull. Acad. Méd.* 1932. Feb. 2. 96th Year. 3rd Ser. Vol. 107. No. 5. pp. 152–154. With 1 chart in text. [1 ref.]

A case of eruptive fever contracted on board the French man-of-war "La Bretagne" is described. It was treated by injections of the whole blood of a convalescent from typhus fever, three doses of 20 cc. commencing on the 4th day of the disease. A marked improvement followed and the fever ceased on the 9th day of the disease. [As this infection was contracted on board ship it was probably a case of Brill's disease carried by the rat flea, and not eruptive fever, which is carried by the dog tick; this would explain the action of the convalescent serum.] *D. H.*

Plazy (L.), Germain & Plazy (M.). Du traitement de la fièvre exanthématique par le sang total de convalescent de la même maladie. [**Treatment of Eruptive Fever by Whole Blood of Convalescent.**]—*Bull. Acad. Méd.* 1932. Feb. 9. 96th Year. 3rd Ser. Vol. 107. No. 6. pp. 205–211. With 4 charts in text.

The authors treated 10 cases of eruptive fever by means of injections of whole blood of convalescents from the disease; 8 of these cases were carried by the rat flea and 2 cases by dog ticks. In 4 cases the course of the disease was markedly shortened and in the others the general condition was improved. In the discussion which followed Professor Roux pointed out that eruptive fever carried by ectoparasites of the rat was really a mild form of typhus and that eruptive fever carried by the dog tick was similar to "fièvre boutonneuse" of Tunis and as the latter name held priority it should stand. *D. H.*

* In No. 6 of this Volume, Typhus and Unclassed Fevers, pp. 445, 446 and 452 (Raynal, Labernadie & Pijper & Dau) the term *Proteus vulgaris* is used for the organism employed in the Weil-Felix reaction in place of the *B. proteus* of the respective originals. This terminology was adopted in 1928 [*Bull. of Hyg.*, Vol. 3, p. 90] and has been hitherto followed. Dr. Felix points out that the use of *Proteus vulgaris* is not the general practice. For this and other reasons these strains will in future be classed as *Proteus*, and not *Proteus vulgaris*.—[Ed.]

Blanc (Georges) & Caminopetros (J.). Études épidémiologiques et expérimentales sur la fièvre boutonneuse faites à l'Institut Pasteur d'Athènes. [**Epidemiological and Experimental Studies on Eruptive Fever made at the Pasteur Institute of Athens.**]—*Arch. Inst. Pasteur de Tunis.* 1932. Mar. Vol. 20. No. 4. pp. 343–394. With 26 plates & 3 charts. [40 refs.]

The authors agree that the name " fièvre boutonneuse " should stand although it is not a good one since the rash does not consist of " boutons " but of papules and that the name fièvre exanthématique of Marseilles should lapse.

In 1930 the same disease was identified at Volo in Greece and the authors commenced the investigations which are recorded in this paper. One feature of the disease in Greece is the peculiar " patchy " distribution—numerous cases in Volo, a few in the Piraeus, none in Athens, a few also in the desert island of Delos. This distribution has been explained by the authors who found that dog ticks collected from Volo and Piraeus readily infected man whereas dog ticks collected in Athens proved to be non-infective ; a single tick from Volo might infect whereas the emulsion of 50 or 60 Athens ticks did not.

Numerous experiments were carried out with dog ticks collected from Volo and elsewhere and the carriage of the virus by these parasites, male and female, larvae and nymphs, was abundantly confirmed ; it was also shown that the virus is carried over the winter season in the bodies of the ticks, and that the eggs of infected ticks which had been thoroughly washed were capable of producing infection. The authors argue from this that a vertebrate host such as the dog is not necessary, the virus being carried on in the tick from generation to generation, the dog acting merely as a carrier and feeder of the tick.

The first series of experiments, 9 in all, were carried out on 33 subjects who were inmates of institutions and were suffering from general paralysis or dementia praecox, the fever produced being employed therapeutically. A second series consisted of 52 experiments on 97 subjects.

It was shown that emulsion of ticks was still infective after passage through Chamberland L 2 and L3 filters. Monkeys were shown to be readily susceptible to infection when inoculated with the blood of patients ; these animals reacted with fever which lasted about 10 days and during this period their blood was infective for man.

Young dogs were collected from areas where the ticks had been shown to be non-infective and were inoculated with blood of patients and also with emulsions from infective ticks : the dogs did not react. The blood was taken from 9 of these animals at various intervals and inoculated into 28 susceptible people without reaction [Weil-Felix reaction not stated]. The authors are of opinion that dogs are not susceptible and do not act as reservoir. In the same manner rabbits, rats, guineapigs, pigs, sheep and pigeons were all tested, with negative results. However it was found that white mice and a small Macedonian rodent, the spermophile (*Citillus citillus*), were definitely susceptible to infection, the latter animal especially so. Blood from patients was inoculated into white mice, the animals were killed one week later and the brain emulsion inoculated into man ; a typical attack of the fever with eruption followed [plates shown]. Spermophiles do not get fever and do not die but the blood is infective for man after an incubation of about 7 days and for about 12 days thereafter, and the infection has been passed in series through many generations

each series being shown to be infective for man ; the virus does not lose in virulence by passage. This rodent is peculiar to Macedonia and does not occur in France or Italy so cannot be the reservoir in these places. In 82 instances transmission of the disease was attempted from man to man ; 50 of these were successful, in 30 there was fever with no eruption, in 7 fever with abortive eruption, in 4 fever with rash on the face only and in 9 fever with typical general eruption, but it is noted that atypical cases may give rise to typical. It was also shown that the red blood cells are infective, as well as the serum, plasma, and washed white cells. Immunity lasts at least two months.

[The numerous photographs of patients give a good idea of the skin eruption.] *D. H.*

Combiesco (D.). Recherches expérimentales sur la fièvre exanthématique constatée à Constantza (Roumanie). [**Researches on Eruptive Fever at Constantza.**]—*C. R. Soc. Biol.* 1932. Mar. 11. Vol. 109. No. 9. pp. 793–794.

Continuing his researches [*ante*, p. 455] the author found that the disease could be passed from man to man by inoculation of blood taken during the course of fever ; and that the same quantity from the same donor produced very different results in different people, typical fever in one, mild and atypical in others.

He also found that either the plasma or blood cells produced infection as well as whole blood. After the epidemic had ceased in Constantza 20 dog tick nymphs were collected from several dogs, and having developed into adults were emulsified and injected into two volunteers ; both developed the fever. White mice and the sphermophile were shown to be susceptible. Two dogs obtained from an area free from fever were inoculated with blood from a fever case ; they were not affected in any way ; 10 days later the dogs were bled and a monkey was inoculated ; this animal developed fever and its blood proved infective for man. *D. H.*

Petzetakis. Un cas de fièvre exanthématique observé à Alexandrie. [**Case of Eruptive Fever at Alexandria.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Mar. 14. 48th Year. 3rd Ser. No. 9. pp. 356–358.

In 1928 the author observed a case of fever at Alexandria which was clinically typical of eruptive fever, the first case of the disease noted in Egypt. The subject was a Greek, but he had been resident in Alexandria for several years. The case was not published at the time as the " tache noire " and enlarged glands were not present, and the Weil-Felix reaction taken on the 10th day of the disease was negative. No other cases have been reported. *D. H.*

Kuijer (A.). Een nieuwe vorm van febris non classificata ? [**A New Non-Classified Fever ?**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. June 21. Vol. 72. No. 13. pp. 854–866. With 9 graphs.

The author describes an apparently unknown infectious disease of 5–11 days duration with 9 case reports. Five occurred in native soldiers belonging to one company. It is characterized by :—

(1) acute onset ;

(2) bronchitis and exudative pleuritis of early occurrence, without catarrhal symptoms of the upper air passages ;

(3) a rash, also early, of a rather varied character (maculo-papulo-vesiculo- petechial) and disappearing with desquamation ;

(4) somewhat painful general swelling of the lymph glands.

No other characteristic symptoms are mentioned. There were no deaths.

[Except for the facts that the total leucocytes usually were less than 10,000 per cmm. (once only reaching 14,200) and that the monocytes, though increased relatively and absolutely, did not reach so high a proportion as is common in Glandular fever or infective mononucleosis, the symptoms and course of the condition described bear many resemblances to that disease.—Ed.] *W. J. Bais.*

VAN SLYPE (W.). Un cas de fièvre rouge congolaise. [**Case of Red Congolese Fever.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Dec. 31. Vol. 11. No. 4. pp. 419–422.

The author met with a case of fever in his district (Dilolo, Jubea district) similar to those described by PIERAERTS [*ante*, p. 454] under the name of "fièvre rouge." The principal clinical features of the disease were profuse pink rash, enlarged glands in the axillae, lymphocytosis, absence of pains in joints and of desquamation. *D. H.*

CANNAVO (L.). Osservazioni e ricerche in un caso di febbre esantematica mediterranea.—*Riforma Med.* 1932. June 4. Vol. 48. No. 23. pp. 862, 865–867. With 3 text figs. [44 refs.]

MONTEIRO (J. Lemos). Typho exanthematico de S. Paulo. IX. "Rickettsioses" e seu conceito pluralista.—*Brasil-Medico.* 1932. Apr. 16. Vol. 46. No. 16. pp. 361–362.

PECORI (Giuseppe). Febbre esantemica, febbre bottonosa o tifi benigni aberranti ?—*Policlinico.* Sez. Prat. 1932. Aug. 29. Vol. 39. No. 35. pp. 1353–1357.

REITANO (Ugo) & BONCINELLI (Umberto). Ricerche sulla cosidetta "febbre esantematica mediterranea." Nota preventiva.—*Policlinico.* Sez. Prat. 1932. Sept. 5. Vol. 39. No. 36. pp. 1389–1393.

DENGUE.

HOLT (R. L.) & KINTNER (J. H.). **Notes on Dengue.**—*Philippine Jl. Sci.* 1931. Dec. Vol. 46. No. 4. pp. 593–599. With 2 text figs. [1 ref.]

——, FLEMING (Wm. D.) & KINTNER (J. H.). **Resistance of Dengue Virus.** *Ibid.* pp. 601–609. With 4 charts in text. [2 refs.]

It has been shown both by epidemiological study and by experimental inoculation that an attack of dengue confers an immunity which lasts at least 12 months. But the authors observed recently the case of a lady, the wife of an officer, who had 3 typical attacks in 7 months ; and one of their volunteers, on whom batches of infective mosquitoes had been fed without effect, and who was sent to another station about 30

miles away, after 35 days contracted dengue. To explain these discrepancies they suggest that there may be strains of virus and one person may be immune to his homologous strain but susceptible to other strains. In conflict with this theory was the fact that infected mosquitoes brought from other areas failed to infect volunteers who had previously been infected by the local strain of virus.

The authors also succeeded in infecting mosquitoes in series up to the third feeding by means of feeding on emulsions of crushed infected mosquitoes but after the third transfer the virus could not be demonstrated. The virus was also shown to be resistant to freezing as well as to the action of X rays and ultra violet rays. Infected mosquitoes were exposed to the rays for 15 minutes. *D. Harvey.*

CARRION'S DISEASE.

KIKUTH (Walter). Experimentelle Untersuchungen über Oroyafieber und Verruga peruviana. [**Experiments on Oroya Fever and Verruga Peruana.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1931. Vol. 73. No. 1/2. pp. 1–14. [7 refs.]

The author refers to the work of NOGUCHI on *Bartonella bacilliformis* which proved that this germ was the cause of Oroya fever and that verruga peruviana and Oroya fever were different manifestations of the same disease. He also refers to the work of MAYER and himself done about the same time on a case of verruga peruviana admitted to the Tropical Institute in Hamburg. An emulsion of an excised papule injected into monkeys produced typical lesions and Bartonella were observed in the blood of one of the infected animals; two of the injected monkeys died of Oroya fever.

The present paper deals with research carried out with a culture of Bartonella received from NOGUCHI's laboratory in New York after the Japanese scientist's lamented death. The author succeeded in keeping the culture going in series by subculture on Noguchi's medium after incubation for 3 or 4 days at 30°C. and then kept on ice for two weeks without any loss of virulence. The Bartonella in culture resembled *Rickettsia prowazeki* in appearance but they showed true motility. The germs could not be passed through the ordinary bacterial filter although they were undoubtedly smaller than any of the ordinary bacteria such as Brucella. Positive cultures were obtained both from the papules in monkeys and from the peripheral blood of the infected animals. As long as the papule remains the Bartonella can be found in the peripheral blood; the verruga papule is the reservoir of the Bartonella; even in the mildest cases of verruga there is a septicaemia. But in none of the animals injected with cultures did Oroya fever develop, possibly because the culture had lost virulence as regards Oroya fever but retained its virulence for verruga papule indefinitely. Removal of the spleen previous to injection of monkeys did not enhance the virulence of the germ nor was fever or anaemia produced. The incubation period of experimental verruga in monkeys was from 9–20 days. It was also shown that after an animal had recovered from the papule it was immune to further inoculation. The author attempted to infect other animals such as dogs, guineapigs and hamsters, but failed even if the spleen was removed before inoculation.

D. Harvey.

Arce (Julian). Verrue péruvienne ou maladie de Carrion. [**Carrion's Disease.**]—*Rev. Sud.-Américaine de Méd. et de Chirurg.* Paris. 1931. Oct. Vol. 2. No. 10. pp. 1017–1034. With 7 text figs.

This paper, written a few weeks before the regretted death of the author, gives a very full and detailed account of the clinical picture of cases of the disease and is fully illustrated by excellent photographs. *D. H.*

Maldonado (A.). Rôle probable de quelques plantes caractéristiques de la région verruqueuse sur l'étiologie de la verruga du Pérou.—*Bull. Soc. Path. Exot.* 1931. Jan. 14. Vol. 24. No. 1. pp. 27–28.

HEAT STROKE.

CLUVER (E. H.). **An Analysis of Ninety-Two Fatal Heat-Stroke Cases on the Witwatersrand Gold Mines.**—*South African Med. Jl.* 1932. Jan. 9. Vol. 6. No. 1. pp. 19–22.

Of the 200,000 native labourers working on the Witwatersrand Goldfields, over 180,000 are employed on mines of a vertical depth exceeding 2,500 feet. The maximum depth at which work is at present being carried on is 7,640 feet. The increase in temperature on penetrating the earth's crust in these workings is remarkably low, being 1°F. for every 200 to 220 feet. [In Great Britain the increase is usually about 1°F. for every 60 to 70 feet.] The temperature of the virgin rock at a depth of 7,500 feet is found to be 99°F. Therefore it is impossible, without some form of artificial refrigeration underground, to attain atmospheric temperatures more than a few degrees below the rock temperature. These would not be excessive if it were not for the water which is used copiously as a preventative of silicosis, and in consequence there is seldom more than a degree or two of difference between the dry bulb and wet bulb thermometer readings.

The tribal distribution of the fatal cases indicates a greater susceptibility on the part of natives born and reared in cold dry areas. The author emphasizes the extreme importance of temporary acclimatization acquired in a gradual introduction to the unfavourable conditions underground, and points out that the great majority (81) of the fatalities occurred in men during the first four shifts which they worked in a hot area underground. *W. P. MacArthur.*

FRIEND (Norman B.). **The Geographical Distribution and Meteorological Aspect of Hyperpyrexial Heat-Stroke.**—*Med. Jl. Australia.* 1932. Feb. 13. 19th Year. Vol. 1. No. 7. pp. 232–235. With 1 chart in text.

Since the Workers' Compensation Act (New South Wales) was passed, various claims have arisen regarding illness attributed to the effects of heat during open-air work. From a study of the meteorological conditions of Australia, and the clinical records of the Sydney hospitals, the author concludes that the summer weather usual in New South Wales is unfavourable to the production of hyperpyrexial heatstroke, but that both heat exhaustion and heat cramps may occur. The climatic conditions during the summer months in northern Queensland, the Northern Territory, and the northern portion of Western Australia are such as would give rise to hyperpyrexial heatstroke, though less intense than the type of the disease encountered in parts of Asia.

W. P. M.

SHATTUCK (George Cheever) & HILFERTY (Margaret M.). **Sunstroke and Allied Conditions in the United States.**—*Amer. Jl. Trop. Med.* 1932. May. Vol. 12. No. 3. pp. 223–245. With 4 maps & 11 figs.

The irregular distribution of heatstroke and allied conditions in different tropical countries and also in the temperate zone is a curious anomaly. In the hope of promoting understanding of this matter the authors have undertaken an analysis of the deaths officially reported as due to heat in the United States Registration Area during the years

1900–1928. The mortality rate per 100,000 varies from 0·3 in 1920 to 12·8 in 1901. Although there is much variation from year to year, a downward trend sufficiently marked to be statistically significant is apparent, this decline affecting the urban rate more than the rural. The death rates by ages are relatively high during the first year of life, and very low thereafter up to the age of twenty. Then there is a gradual rise to the age of seventy, at which point the rates rise sharply.

The records which have been most extensively studied are those for Massachusetts. Here the specific death rates for ages below twenty and above seventy are about the same for both sexes. But between twenty and seventy, the rates are about three times as high for males as for females, suggesting a correlation with occupation during the most active years of life. Also the percentage of male deaths during the past fifty years shows a marked downward trend, apparently due to the increasing employment of women in industry.

It is interesting to learn that the death rate from heat effects in States having a large coloured population is 2·4 times as high for the coloured as for the white, which again suggests a correlation with occupation.

The authors conclude that a large proportion of the deaths from heat in the United States are due to industrial conditions.

W. P. M.

Hearne (K. G.). **Hyperpyrexial Heatstroke : a Mesopotamian Experience, with Some Aetiological Views and a Method of Prevention resulting therefrom.**—*Med. Jl. Australia.* 1932. Feb. 13. 19th Year. Vol. 1. No. 7. pp. 226–232.

This paper is based on a study of some 240 cases of true hyperpyrexial heatstroke treated by the author while serving with the British Expeditionary Force in Mesopotamia from 1916–1918. He believes that the essential cause of heatstroke is suppression of perspiration, a premonitory sign which he found to be invariably present for a time varying from one hour to forty-eight hours prior to the attack, and he stresses the importance of watching for this most reliable warning sign. During heat waves he adopted preventive measures in his own wards which proved remarkably effective. The patients were warned to report immediately any stoppage of sweating or frequency of micturition. In addition, regular inspections (hourly on the hottest days) of all patients were carried out either by the author himself or by trained assistants in order to detect any who might develop suppression of perspiration while asleep. A mere touch on the chest or abdomen was sufficient to recognize the typically hot dry skin of oncoming heatstroke. All patients in this incipient state were stripped and covered with a sheet sprayed with just sufficient ice water to keep it moist without damaging the mattress, evaporation being assisted by overhead punkas or portable electric fans. In such conditions, the author found heatstroke to be preventable with absolute certainty. *W. P. M.*

Redmond (J. Johnstone). **Venesection in Heat-Stroke.** [Correspondence.]—*Lancet.* 1932. Feb. 20. p. 425.

The author writes :—

" When passing through the Red Sea I was called to see a steerage passenger. I found a stout, middle-aged Irish woman with consciousness

completely lost, flushed face, skin very dry and hot, stertorous breathing—temperature between 108° and 109°F. I tried every remedy I knew of and found recommended, but it was all in vain, so at last I decided to try venesection and truly the result was wonderful. Within a short time the patient was conscious and next day the temperature was nearly normal."

[Was a wet sheet one of the remedies tried?] *A. G. B.*

Willoughby (Hugh) & Aslett (Edward). **"Heat Stroke."**—*Jl. Roy. Nav. Med. Serv.* 1932. Jan. Vol. 18. No. 1. pp. 34–39.

This is a general paper describing and differentiating (in a useful table) the various types classed under "Heat Stroke." Treatment is also discussed but the paper contains nothing new. *J. H. Tull Walsh.*

MISCELLANEOUS.

i. Laquièze (E.). Les Iles Loyauté. Etude démographique. [**Vital Statistics of the Loyalty Isles.**]—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. pp. 431–436.

ii. ——. Les Isles de la Loyauté : pathologie, urbanisme et situation économique.—*Ibid.* June 8. Vol. 25. No. 6. pp. 585–589.

i. These coral islands, consisting of Mare, Lifou and Ouvea, lie to the east of and about 60 miles distant from New Caledonia. Their area is about 800 square miles. They are populated by Polynesians, whereas the people of New Caledonia are Melanesian. The last complete report of the group was made in 1911–12. Lifou, the largest, was found to contain 6,150 people, but detection of errors in the census reduced this figure to 5,859. Mare has 3,160 inhabitants and Ouvea 1,999 : Ouvea contains two races, one indigenous, the other from an island of the same name in the Wallis group, an invasion of the 18th century. The total population is thus 11,018. Since 1869 there appears to have been a gradual loss : thus—1869, 13,000 ; 1891, 12,000 ; 1898, 11,413 ; 1911, 11,173 ; 1931, 11,018. The possible causes are briefly discussed, but nothing of moment emerges. Nothing is said about loss by emigration. In the year 1931 the births exceeded the deaths in each island.

ii. The diseases met with in each island are named.

Lifou—yaws common. Some cases of tuberculosis. No malaria.

Mare—yaws very common : 5 cases of juxta-articular nodules. A few cases of syphilis [without detail] ; tuberculosis in various forms ; 14 cases of elephantiasis. Ouvea—14 cases of elephantiasis ; 3 J.A.N. Yaws in children, one case of goundou. No sign of malaria. Mosquitoes are numerous ; the genus is not stated. [Nothing is said of filaria and a medical officer is quoted to the effect that insect-transmitted diseases are absent.] Leprosy is dealt with in another paper. *A. G. B.*

Placidi (Th.). La médecine et l'hygiène aux Nouvelles-Hébrides. [**Medicine and Hygiene in the New Hebrides.**]—*Rev. Méd. et Hyg. Trop.* 1932. May-June & July-Aug. Vol. 24. Nos. 3 & 4. pp. 113–132 ; 183–208. With 11 figs. & 1 map.

The author in a long and interesting paper discusses the geography of this group of islands, the geology, flora and fauna, climate and population ; the conditions of life are described both in the free state and on the plantations where a number of Annamese are employed ; a brief account of the medical services follows. The depopulation of these islands is discussed but without adding anything to Buxton's article (1926), an abridged form of whose table is reproduced. The reader will find little about the British share in this "Condominium." *A. G. B.*

Porter (F. E.). **Health Conditions in Guam. Report of the Department of Health for the Fiscal Year 1931.**—*U.S. Nav. Med. Bull.* 1932. July. Vol. 30. No. 3. pp. 446–453.

The island of Guam, in the Marianne group, a U.S. naval station, has an area of 210 square miles and a population of 18,620 (1929). There are 9 medical officers, 9 Navy nurses, 1 dentist, 2 chief pharma-

cists, 45 Hospital Corps men and 21 native nurses on duty in the island. The tuberculosis hospital had 11 inmates at the end of the year; it appears that many patients do not avail themselves of it. Ten lepers from Guam have been transferred to Culion, P.I., and four inactive cases are under supervision in the island. Ascariasis in children under school age "continues to be a large factor in the mortality table." Hookworm is increasing, efforts are being made to locate and treat it and a campaign of education is carried on. Yaws is prevalent but easily controlled by treatment; there were 300 cases of yaws and 298 of gangosa under observation [? active cases]. Schools are visited twice a year and anthelmintic treatment given. Sixty-five native nurses have graduated at the training school and ten have not yet completed the course; they fulfil an important mission among women and children. The chief causes of deaths in Agana hospital were—pneumonia 17, tuberculosis 13, dysentery [undefined] 12, gastro-enteritis 9, ascariasis 4. *A. G. B.*

New Guinea, Territory of. Report to the Council of the League of Nations on the Administration of the Territory of New Guinea from 1st July, 1929, to 30th June, 1930. 146 pp. 1931. Canberra.—[**Part VII.—Public Health.** pp. 31–52.]

There were 15 medical officers in the Territory in June 1930, of whom one was a missionary and 3 were in private practice. The total expenditure on medical and sanitary services was £71,408, representing about 20 per cent. of the total revenue. Owing to the high infant mortality it is contemplated to form a chain of infant welfare centres; the first is to be staffed by two European nurses, well trained in infant welfare work as well as in general nursing; they will have to speak the native dialect; their duties are laid down. There were admitted to hospital as in-patients 345 Europeans, 35 Asiatics, and 7,742 natives of whom as 46·3 per cent. were indentured labourers. The chief causes of native morbidity were tropical ulcer, yaws, pneumonia, leprosy, infantile paralysis, tuberculosis; pneumonia, dysentery and tuberculosis were the causes of 174 deaths out of a total of 314. The training of natives as medical "tul tuls" was continued, raising the number from 2,495 to 2,750. Supplies were issued free of charge to Missions for medical work.

At Rabaul the most frequent cause of hospital admission (? Europeans) was malaria; among natives the top places were occupied by tropical ulcer and pneumonia. Anophelines occur in Rabaul as a seasonal invasion between December and May: they are brought into the town by wind and find suitable breeding places there. Of 4,815 specimens of mosquito larvae only 16 were anophelines (*A. punctulatus* var. *mollucensis*) [elsewhere 4,815 breeding foci are mentioned]. Ten specially trained natives were engaged in mosquito prevention under an Asiatic overseer. Paris green proved an effective larvicide.

"It is interesting to note that since Paris Green was substituted for oiling in the treatment of water pools on the foreshores of the town, the pools, previously devoid of life, have become the habitat of a small indigenous fish that proved to be larvivorous under experimental conditions, without positive identification. This fish is believed to be the fry of a marine species."

The night blood of 242 natives was examined between 9 and 10 p.m., and of 148 of these between 9 and 10 a.m. next day. Of the nocturnal

bloods 45 or 18·5 per cent. showed microfilariae and of the 148, 29 showed microfilariae in the night blood and 8 of these embryos also in the day blood. *A. G. B.*

BALDWIN (A. H.). **An Account of a Medical Survey of Norfolk Island, directed Primarily to the Question of Hookworm Disease, but also including a Series of von Pirquet Tests.**—*Med. Jl. Australia.* 1932. Apr. 16. 19th Year. Vol. 1. No. 16. pp. 543–548. With 5 text figs.

The varied history of Norfolk Island is sketched.* Its park-like surface without undergrowth is figured. Its inhabitants all live isolated on small farms and holdings of a few acres with separate water supplies from roof tanks or wells. Its volcanic fertile soil is very deep and in it deep pit latrines are dug. Its climate is perhaps the mildest in the world, with an average rainfall of 50 inches and grass is rarely parched. 143 persons were examined by Willis's technique for hookworm infection but none was found though infected persons frequently visit the island ; 67 were examined for malaria parasites and 80 for microfilariae, but none were found. *Culex quinquefasciatus* lived in nearly every room examined. *Ae. egypti* was not discovered. Von Pirquet tests suggest the absence of bovine and presence of familial human tuberculosis. For faecal protozoa 116 were examined by wet eosin and wet iodine staining. The findings were *Ent. coli* (vegetative) 2, cysts 6, both 1 ; giardia cysts 12, *Trichomonas hominis* 1, *Endolimax nana* 1, ciliata probably from soil 1. *Clayton Lane.*

GAIDE & MARQUAND. Note sur la situation épidémiologique de l'Indochine en 1931. [**The Epidemiological Situation of Indo-China in 1931.**]—*Buli. Soc. Méd.-Chirurg. Indochine.* 1932. Apr. Vol. 10. No. 3. pp. 328–346. With 7 graphs.

The diseases considered here are variola, cholera, plague, typhoid, cerebrospinal meningitis and, shortly, measles and diphtheria. Graphs for the first four show the monthly incidence for 1930 and 31, and the yearly incidence for 10 years. With the exception of a small rise in 1930 plague has since 1922 steadily decreased. The mainland of Annam was quite free in 1931, but 44 cases occurred early in the year in the small island of Poulo-Cecir-de-Mer, 60 miles from the mainland, and the disease reappeared at the end of the year. This annual recurrence, noted for several years, is a real danger for Annam, for at this season the islanders visit the mainland for work and the markets. Periodic vaccination is thought to be the best course. It may be noted that there were 2,055 cases of variola in Indo-China in this year with 527 deaths. *A. G. B.*

CALCUTTA. **Annual Report of the Calcutta School of Tropical Medicine, Institute of Hygiene and the Carmichael Hospital for Tropical Diseases 1931** [ACTON (H. W.), Director].—139 pp. With 3 figs., 2 charts & 1 plate. 1932. Calcutta : Bengal Govt. Press.

This consists, as usual, of the Report of the Director of the Calcutta School of Tropical Medicine and a series of reports from the Professors

*Norfolk Island is 930 miles from Sydney, has an area of 8,528 acres and 940 inhabitants (descendants of the mutineers of the *Bounty*).

and Heads of Departments. The Director has some interesting observations to make on a visit he paid to Imphal in Manipur State, and the Naga country. This aboriginal people living in a mountainous district is cut off from civilization and forms an endemic focus for relapsing fever, Naga sore [see this *Bulletin*, Vol. 26, p. 686] and infective granuloma. Here relapsing fever is spread probably by ticks, and when the disease extends to the plains it is louse-borne. "In India . . . relapsing fever is nearly always associated with the proximity of hills and an aboriginal population." The Nagas never use milk as food; they drink a weak beer: and this is regarded as the main cause why cholera does not spread from India into Burma. Near Imphal *Fasciolopsis buski* infestation is fairly common; pigs are kept; the infestation of man is attributed to certain fish which are smoked and the flesh eaten raw and not to the water chestnut.

The Director has also something to say about that subject of perennial interest, blackwater fever. He finds three factors always associated with the disease: (1) an aboriginal population living within a quarter of a mile radius of (2) a civilized non-immune population, (3) a carrying Anopheles of the *funestus* group. The aboriginals never suffer from blackwater. The theory that any one species of Plasmodium is implicated is untenable. He refers to the monkey malaria which has been transmitted to man and to the haemoglobinuria induced by it in one species of monkey [*ante*, p. 701]. A practical application in the field would be the removal of the aboriginals from the civilized people.

Questions about malaria which called for investigation were—What degree of humidity and temperature—best expressed by the wet bulb temperature—is required to allow fertilization of the malarial parasite to take place in the mosquito, and does any subsequent alteration of temperature make any difference to the maturing of the parasites? Work by STRICKLAND and ROY seems to show that there is an optimum temperature for flagellation and fertilization of the malarial parasites and that a low temperature is necessary for the oocysts to reach full maturity. Thus during the monsoon the parasites rarely develop into sporozoites but in the cold weather they were found to have done so. To study this problem an incubator has been devised and is here described and figured. As is pointed out, if it can be shown that transmission is only possible between certain limits of atmospheric humidity and temperature all anti-larval and anti-mosquito measures could be concentrated into such periods with an immense saving of labour and material.

A commencement is being made of the study of respiratory diseases, which are responsible for nearly one-third of the deaths in the Indian army and jails, a much higher rate than in the British Army in India.

The All-India Institute of Hygiene built with funds supplied by the Rockefeller Foundation is now complete. There were to have been six sections dealing respectively with public health administration, epidemiology and vital statistics, maternity and child welfare, sanitary engineering, malariology and rural hygiene, biochemistry and nutrition, but the 3½ lakhs for the running of the Institute has been reduced to 2 lakhs, and the apportionment is still undecided. There is much else of interest in this full report. [For review of the 1930 report see this *Bulletin*, Vol. 28, p. 778.]

A. G. B.

KING INSTITUTE OF PREVENTIVE MEDICINE, GUINDY. **Report for the Year ending 30th September 1931** [KING (H. H.)] **& Report of the Public Analyst to the Government of Madras** [HAWLEY (Herbert)]. —pp. 39+2. 1932. Madras. [8 annas].

Vaccine lymph is one of the main products of the Institute. It is now issued in a dilution of 1 in 7 instead of 1 in 5, which has been rendered possible by the attainment of an increase in potency. That increase has resulted from the introduction of an additional buffalo calf in the ordinary sequence of animals—ox calf to rabbit, to buffalo calf to ox calf—used for the production of seed lymph. The average yield of issue-lymph obtained with this seed-lymph per calf was raised from 23·8 gm. to 26·2 gm., so that only 844 calves were used as against an average for the previous 3 years of 1,112. Plague investigation has shown that *X. cheopis* is the most efficient flea vector in nature, whereas in the Presidency of Madras *X. astia* is the commoner species. Moreover "*X. astia*, though it can carry plague does so very poorly and does not appear to carry plague infection over from one season to another, for when *X. astia* alone was present epizootics have not carried over in the off season." The public analyst's report is largely occupied with data relating to the extensive adulteration of food. *W. F. Harvey.*

SUDAN. **Report on Medical and Health Work in the Sudan for the Year 1931** [ATKEY (O. F. H.), Director].—97 pp. With 1 folding map. 1932. Khartoum.

Under the heading, General Health of the Sudan, it is noted that the epidemic of smallpox which had swept Darfur for three years came to an end and the comment is made, "The havoc wrought in this recently occupied province by successive epidemics of relapsing fever and smallpox, in the absence of an organized medical service, is a sufficient demonstration of the need for an adequate medical organization even among primitive people and, in particular, in border provinces." The health of British officials showed a slight deterioration: the average number of days lost per official was 2·46 (1·7 in 1930); in a force of 930 there were 8 deaths and 5 invalidings. A table giving the number of days lost through sickness in the various provinces for British, Sudanese and Egyptians respectively shows that the Upper Nile and Bahr-el-Ghazal are the most unhealthy for British officials.

Epidemic Diseases—Cerebrospinal meningitis. A total of 348 (865) cases with 240 (665) deaths, a large decrease. In Mongalla province this disease was epidemic in 1918–22, almost absent in the next 4 years, and again epidemic in 1927–30. The factor which favours this epidemicity is believed to be the low standard of housing. In Khartoum and Omdurman in 5 months there were 224 cases all among Sudanese, with 159 deaths.

Diphtheria. 183 cases as against 68 in 1930; the disease is endemic in Khartoum and Omdurman (85 cases) and in Halfa District; in one village in this district 32 deaths occurred.

Relapsing fever. Epidemics recorded in the last report in Blue Nile and Khartoum provinces were continued and two outbreaks occurred in Darfur province starting in immigrants from French territory. The account of the Blue Nile epidemic has several points of interest. 386 cases occurred in the last five months of 1930, and 492 up to June, 1931, when it ceased abruptly. The case fatality was 11·9 and 13·4 per

cent. ; 5 per cent. of cases were natives of the Gezirah, a completely unimmune population though they are mostly lousy ; it is concluded that the virulence has greatly diminished since 1926. Several contacts whose blood was examined showed spirochaetes but no clinical signs of the disease. Of all the patients only 35 per cent. gave positive blood films at any time of their illness. Besides the ordinary measures to restrict spread all contacts left in the field were given grey oil intramuscularly and marked characteristically on the finger nail with silver nitrate. Since only one out of 200 so marked was afterwards admitted to hospital 281 contacts were placed under close observation in four groups receiving tartar emetic, novarsenobillon, grey oil (1·0 cc.) and nothing at all, respectively. The incidence in the grey oil group was least, 8·3 per cent. against 10·2 in the controls and it is thought that, if this result is confirmed, the use of grey oil may prove a valuable measure of control. Trial seemed also to suggest its value in treatment.

Smallpox. 218 cases as against 2,179 in 1930.

Endemic Diseases—Ankylostomiasis. Out of 760 routine examinations in Dongola hospital 46 cases were found ; no evidence of infection in the irrigated area of the Gezirah.

Schistosomiasis. In the Blue Nile province (irrigated area) the position is causing serious anxiety. The infection rate among local natives has risen from 0.2 per cent. in 1930 to 0.75 per cent. in 1931 and the number of locally infected children—a surer indication—from 20 to 51. Of 116 infected cases 56 had been examined in the previous year and of these 40 had been found free ; they had therefore contracted the disease in the interval. Of the immigrant population from Nigeria and French territory 5·6 per cent. were found infected. Snail destruction was advisedly limited to canals in the endemic areas. Treatment with molluscicide in May and July destroyed the snails which reappeared in November. Children then found infected were assumed to have been so before the operations started. In 1932 all the canals in the endemic areas are to be treated twice and in the case of some 3 times. The most difficult problem is the control of immigrants of western origin. In spite of quarantine many infected persons penetrate into the irrigated area. In December 1931 there were 346 infected westerners ; they are ignorant people who will not obey regulations.

The importance is realized of a proper lay-out of villages and the installation of bore-hole latrines in the yards of every house, but these measures must await the return of prosperity.

In Dongola province the infection is dealt with largely by examination and treatment, which are voluntary. The infection rate from 1928 to 1931 was 18 per cent., 12, 9·3, and 4·6 per cent. This diminution is important because the Dongolawi travels all over the Sudan and works extensively in the Gezirah irrigated area. In the White Nile province the disease is almost entirely rectal ; infection is by *Planorbis boissyi*, on the shallow foreshore of the river, only found from March to June ; here the digging of wells is a good preventive.

Blackwater fever. 43 cases with 20 deaths, 20 and 6 in 1930 ; 29 of the 43 were natives of the northern Sudan and 26 of the 43 occurred south of the 12th parallel.

Dysentery. A total of 2,209 cases. In 1931 amoebic dysentery caused 3·28 per cent. of hospital admissions and bacillary 0·41 ; bacillary dysentery is essentially a disease of the towns.

Guineaworm. A serious cause of disablement in the southern Sudan. A total of 588 cases.

Kala azar. There are 3 recognized endemic areas, all near the Abyssinian border ; cases were 84 (56), 48 from a newly occupied area in the south-east of Mongalla province ; 28 were among natives of endemic areas, 56 among persons born and bred outside these areas. Of a patrol of 74 soldiers, police and carriers who visited the Kenya border, 20 were found on their return to have kala azar.

" It would seem that Kala-Azar is endemic in the foot-hills and plains along the whole Sudan-Abyssinian border. Immigrants, whether Abyssinians from the plateau or Sudanese from the plains, are more susceptible to the disease than the local inhabitants. There are definite localised foci of the disease in certain areas and these may be so unhealthy as to be known to, and avoided by, the local natives. Despite the fact that an area may have been thus uninhabited for many years, cases immediately occur if it is reoccupied. It seems that an alternative host to man carries on the infection in his absence."

Leprosy. A list of leprosy cases is given by provinces. The largest number is 4,000 from the southern Bahr-el-Ghazal. The incidence in the northern and central provinces is very low, between the 12th and 6th parallels it becomes heavier and south of the 6th parallel it increases again, especially as the divide between the Congo and Nile watersheds is approached. Four districts are cited in evidence where the percentage of lepers lies between 0·63 and 2·4 (Tembura and Yambio). These heavily infected tribes are living in a country which owing to the heavy *Glossina morsitans* infestation are entirely devoid of cattle, and eggs are very scarce. A number of tables are given of the types of cases, infection of relatives, fertility and infant mortality.

The Medical Inspector in charge of three camps says that a large proportion of early cutaneous cases remains stationary and requires neither treatment nor segregation. They should not be brought into a Leprosy settlement unless they become " open " cases. Strict segregation of highly infective cases should be extended. Measures for the improvement of living conditions and especially of the food are more important than drugs. Bush dispensaries manned by trained native staff should be developed to deal with leprosy on the spot. Up to date in the south some 70 per cent. of the lepers have been admitted to the large settlements or camps and 40 per cent. have been repatriated.

Malaria. There were no serious epidemic outbreaks. Figures are given, with reservations, of the incidence of the three types of malaria. The prevailing type in the country districts is believed to be benign tertian, and in the neighbourhood of the towns and government stations malignant tertian ; quartan is relatively rare.

*Undulant fever.** 25 cases reported, 21 of which were from the Blue Nile and Kassala provinces.

Rabies. 18 cases of canine rabies and 3 of hydrophobia. Rabies was unknown before 1924 and has now spread all over the country except to Dongola and Halfa provinces. Every effort is made to destroy surplus dogs.

Sleeping sickness. In the Bahr-el-Ghazal province 61 (37) new cases were found, all in an area abutting on French Congo. The cause of the retrogression is explained and measures are being taken to reduce the infection. Trypansamide has been the routine treatment. Since 1918 a total of 3,746 cases has been treated and 47 per cent. are still

*The term Malta fever is used.

living. The average life of treated patients is 8 years 1 month. No cases were detected in Mongalla province in spite of its proximity to infected areas in Uganda and the Belgian Congo.

Syphilis. The incidence is steadily decreasing. The natives come readily for novarsenobillon but as a rule do not remain for more than one or two injections.

Tuberculosis. A total of 684 cases was admitted to hospital, 593 contracted in the Sudan; 390 were pulmonary. A table of the percentage incidence relative to total hospital admissions goes to show that no increase of pulmonary tuberculosis is taking place in the Sudan as a whole. A careful survey of the Nilotic Negroid tribes of the Upper Nile Province discovered 39 cases in 181,000 persons, an infection rate of 0·2 per 1,000. The majority of these tribesmen have been little in contact with the outside world; it is hoped to keep their tribal organization intact and thus mitigate or defer their exposure to the infection. In the Bahr-el-Ghazal the tribes most heavily infected with leprosy are those least tuberculized. Tables are given of tuberculin (Mantoux) tests.

Enteric fevers. A total of 100 cases of typhoid and paratyphoid; 73 in 1930.

Yaws is widespread through the Southern Sudan beyond the 10th parallel. A striking decrease in the last few years is attributed to treatment, though incomplete, with novarsenobillon, " a prophylactic agent of the greatest value."

In the report on the health of Khartoum province there is matter of interest about bore-hole latrines. The 26 that were sunk at first gave satisfactory results; later it was found that an excessive number of persons was using them. It was therefore decided to sink bores for every house. Commencing on October 7 with 2 teams of 6 prisoners each, by the end of the year 145 were sunk or about 12 per week. Each bore is sunk to a depth of 7 metres. In Omdurman it was found that the auger would not penetrate owing to the hardness of the soil and ordinary pit latrines had to be dug.

Vital statistics of Khartoum Province—population 277,752; births 5,144 or 18·5 per mille, deaths 2,862, or 10·3 per mille, infant mortality 60·8 (49 in Khartoum, 86 in Omdurman).

The report deals also with the health of Port Sudan where the chief sanitary problems are the limitation of fly breeding and the disposal of sewage; with medical surveys of Nilotic Negroids of Upper Nile Province, which are sketchy; with the medical work carried out by Missions, three of which have in all five doctors; with vital statistics, medical examination of schools, quarantine at Wadi-Halfa, Port Sudan and the Suakim pilgrim quarantine, and training (medical, midwifery and nursing). *A. G. B.*

VAN PATOT (P. N. Tissot). Vergelijkend overzicht van den gezondheidstoestand in het Nederl.-Indische Leger over 1930 en de laatste tien tot vijfentwintig voorafgaande jaren. [**Hygiene in the Army of the Netherlands Indies for 1930 and for 10 to 25 Years previously.**]—*Bijblad o. h. Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. June. Bijblad 3. pp. 125–175 (5–55). With 31 graphs.

The morbidity of the European is always on a higher scale than that of the non-European and for 1930 this was in the proportion 70·9 per cent. to 43·7 per cent., or for the combined groups, 49·5 per cent.

This may be compared with the combined figure, 58·6 per cent. in 1928, for the army in British India. Highest among all diseases affecting Europeans (20 per cent.) are the venereal diseases, whereas the highest among non-Europeans is malaria (10·1 per cent.). A table and graph show the typhoid fever morbidity from 1905 with its percentages in that year of 17·9 and 6·9 among Europeans and non-Europeans respectively to 1930 in which year these had fallen to 1·5 and 0·7. It was in 1915 that general vaccination for this disease was introduced and from 1915 that the fall has been striking and continuous. Malaria provides equally interesting figures. Here the morbidity was 72 per cent. in 1898 but had diminished to 7 per cent. in 1922. It was also 7 per cent. in 1930. No cholera cases have occurred in the army since 1920. Statistics of the dysenteries are somewhat difficult to interpret and are presented under the three denominations amoebic dysentery, bacillary dysentery and enteritis. Fluctuations of the curves of these diseases are considered to be due to improvement of diagnosis with subtraction of figures from one category and addition to another. The frequency curves seem almost to show the effects of the discovery of the cycle of the pathogenic amoebae, the introduction of a modern therapy with the drugs emetine, yatren and stovarsol, and the first isolation of the dysentery bacilli. Good results obtained elsewhere with vaccination against bacillary dysentery led to the addition of a dysentery component to the usual typho-cholera vaccine. Most striking of all the tables given, and illustrating a great advance in preventive medicine, are those relating to beriberi. The morbidity from this disease among non-Europeans—to take a few instances—was 30·6 per cent. in 1887, 1·5 per cent. in 1907, 0·16 per cent. in 1924 and 0·016 per cent. in 1930. Various other diseases receive consideration but one further reference will suffice. Tropical sprue practically does not occur in the army among non-Europeans. Some cases, however, occur among the Europeans every year. *W. F. H.*

SEQUEIRA (James H.). **The Educational Aspect of Public Health Work in the Tropics (with Special Reference to Kenya).**—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. June. Vol. 9. No. 3. pp. 59–78. [14 refs.]

This was a Chadwick public lecture given in London in April, 1932. The author, who was formerly a London consultant, has been nearly five years resident in Kenya. The address contains little that is unfamiliar to readers of this *Bulletin* but the lecturer viewed his subject from a wider angle than usual. He gives evidence of the general ill-health from which the native suffers, instancing malaria, worm infestations, yaws, tropical ulcer, venereal disease. Here he agrees with other observers that syphilis on the whole is mild and is rarely followed by disease of the heart and great vessels : tabes and general paralysis are extremely uncommon. It takes a heavy toll, however, of the unborn child. He notes that " for a long time the Masai have imposed a strict quarantine on syphilitics with a view to combating the high incidence of abortions and still-births." This tribe, however, was unaware that the sterility of its women (estimated at 30 per cent.) and some of its men was due to gonorrhoea. The author has found surprisingly little evidence of congenital syphilis. The chief cause of the high infant mortality, in his opinion, is maternal ignorance—unsuitable food, dirt and the resulting flies.

Discussing modes of access to the native he suggests that the logical avenues are the idea of self-preservation and the strong instinct of reproduction. To the latter he attributes the increasing resort to hospitals and dispensaries ; the natives have learned that the white man's medicine is able to prevent repeated abortions and still-births. He does not mention the attraction of injections for yaws. He discusses the influence of the motor car with its annihilation of distance and of the spoken word at barazas ; exhibits at local shows and cinema films ; housing and food. An interesting development is the " Jeanes school " founded by Government in 1925. Its function is to train visiting teachers, who are selected by the Missions. They are employed in the Reserves to improve the work of the village schools and to promote the general health and well-being. Government provides two-thirds of their salaries. The course lasts two years. The teacher comes back for a refresher course every year. *A. G. B.*

RAYNAL. Quelques notes médicales sur le Guatémala. [**Medical Notes on Guatemala.**]—*Ann. de. Méd. et de Pharm. Colon.* 1932. Jan.-Feb.-Mar. Vol. 30. No. 1. pp. 59–83. With 1 map.

The Institut Pasteur of Paris having been asked to provide a bacteriologist to organize and direct the public health laboratories of Guatemala and to teach in the Medical School, the author was selected and left France in April 1929 on a two years' mission. He here gives some account of the medical geography of the country. It can be divided into three distinct zones—the low lying zone, 600 metres and less above the sea, with a hot humid climate ; a temperate zone at 600–1,800 metres altitude, where coffee, maize, rice and sugar cane are cultivated, and in which the city of Guatemala lies ; the cold zone, where barley and apples are grown and sheep are raised ; this runs up to 3,000 metres. The population consists almost entirely of Indian and Indo-Spanish creoles.

The last epidemic of yellow fever was in 1920–21. The disease is believed not to be endemic, but might easily be introduced again ; the carrier abounds. Malaria is general and has recently extended owing to the movements of the upland population to work in the lowlands and their return to their homes. *A. pseudopunctipennis* is probably the chief vector, but there are also found *A. albimanus* and *A. argyritarsis*.

Hookworm is found to the extent of 7 per cent. in the capital, 64 per cent. in urban populations in the departments and 75 per cent. in rural ; over 221,000 examinations were made by Dr. OCHOA. Leprosy exists but does not seem to be common. In the leper camp the author found that of 30 patients 8 only were clinically cases of leprosy and 5 of these were confirmed bacteriologically. He never saw a case of leprosy in his travels about the country. Leishmaniasis is almost entirely localized to the forests of the Peten province, which lies to the west of British Honduras, and increases in frequency as one goes north. It is a cutaneous form and never attacks mucous membranes. Its chief site is the pinna. Dogs with leishmanial ulcers on ears and muzzle are frequent. Nothing is recorded of its transmission, and it is assumed that phlebotomus occurs in the Peten region but not elsewhere. Smallpox has almost disappeared owing to efficient vaccination. No nervous complication of vaccination has been reported. Trypanosomiasis is unknown. Relapsing fever and dengue are not known to occur, nor has yaws come to light though it is said to exist in Mexico

and in Costa Rica. Intestinal parasites are frequent. In a total of over 221,000 examinations they occured in the following order of frequency—ankylostomes, roundworms, trichuris, oxyuris ; and tapeworms as *T. saginata*, *T. solium* and *H. nana* ; flukes are unknown and schistosomiasis is absent, as elsewhere in Central America. Enteric fever is far from negligible though large epidemics are rare. Undulant and abortus fevers have not been observed.

Typhus is the most widespread contagious disease in the " altos," especially in the coldest months. It is louse transmitted ; 16 of 20 cases gave a Weil-Felix reaction at a titre above 1/200, reaching 1/600 in some instances ; 4 out of 5 inoculated guineapigs gave a characteristic febrile reaction. It is thus true epidemic typhus. It differs, however, from the European form in that male guineapigs get redness and oedema of the scrotum, as in Mexican typhus.

Guatemala has one disease which is special to it, the onchocerciasis described by Robles. It is restricted to the volcanic region on the Pacific side, in the coffee plantations at 800–1,200 metres altitude, and extends into Mexico. The microfilariae are found in the skin. The author snips off some fragments, drops them into a centrifuge tube containing 1–2 cc. of saline solution 9 per mille, shakes the tube from time to time and after a few hours centrifuges ; the microfilariae, sometimes very numerous, are found in the residue.

The information about other diseases is too vague for reproduction.

A. G. B.

Mayer (Martin) & Nauck (Ernst Georg). Von einer medizinischen Studienreise nach Transkaukasien. [**A Medical Tour in Transcaucasia.**]—*Deut. Med. Woch.* 1932. Apr. 15. Vol. 58. No. 16. pp. 629–631.

The authors, who are attached to the Hamburg Tropical Institute, went to Transcaucasia to study tropical diseases, a task which was rendered the easier for them in that the doctors in charge of tropical research were largely their old pupils. They visited Baku in Azerbaijan, Tiflis in Georgia, Sukhum in Abkhasia, Batum in Ajaristan and Erivan in Armenia, as well as other places. The diseases met with were malaria, leishmaniasis, ankylostomiasis and pellagra ; of the last it is estimated that there are in West Georgia 50,000 cases. Both kala azar and oriental sore, as well as canine kala azar, are found. Ankylostomiasis is kept up among the Georgia peasants because the houses are built on piles and the children pass their excreta under the buildings ; these spaces must be wired off. Measures of research and prevention of these diseases in Transcaucasia seem to be actively pursued.

A. G. B.

Antwerp. Institut de Médecine Tropicale " Prince Leopold," 155, rue Nationale, Anvers. Statuts. Règlement organique. [**Prince Leopold Institute of Tropical Medicine.**] [In French & Flemish. 33 pp. Undated, ? 1932.]

The Belgian School of Tropical Medicine at Brussels is, it appears, to be replaced by the new foundation described in the title, situate in Antwerp. Its objects are stated to be—To create and maintain in activity a school of hygiene and tropical medicine for the training of doctors and sanitary agents in the colonies and for the study

of all problems relating to the aetiology and treatment of tropical diseases, and to establish laboratories and clinics annexed to the school. The composition of the board of management, its duties and those of the secretariat and director are here described officially. The courses are to last 15 weeks. *A. G. B.*

GARCIA DE COSA (Cecilia). Siete casos de infección doble por paludismo y por fiebre recurrente. [**Simultaneous Infection by Malaria and Relapsing Fever.**]—*Rev. Sanidad e Hig. Pública.* 1932. Aug. Vol. 7. No. 8. pp. 678–692. With 9 charts.

The author records in detail, with charts and tabulated blood conditions, 7 cases of dual infection by malaria parasites and *Spirochaeta hispanica*. It is a well known fact that in a malarious subject almost any fever may assume a certain periodicity, and in all but one of these cases the clinical diagnosis was malaria, benign tertian in four, subtertian in two. The numbers of plasmodia and of spirochaetes are given in the tables ; the latter varied from 50 to 1,450 per cmm.

The question of the possible effects of the two infections upon each other, or upon the clinical course of the fever is not considered, but might be well worth studying as the mutual antagonism of diseases is an interesting and inadequately investigated problem [this *Bulletin*, Vol. 15, p. 252].

The author remarks that the spirochaetes were usually not found until antimalaria treatment had been started and the question naturally arises " Is it the treatment for malaria which brings to the fore a relapsing fever of the inapparent form ? " ; but she interprets this by saying that the patients usually come up in an apyrexial interval when the spirochaetes are no longer to be found in the peripheral blood, but the malaria parasites may be in considerable numbers. *H. H. S.*

SCHLOSSBERGER (H.) & MENK (W.). **Experimental Investigations of the Therapeutic Effectiveness of Gold Compounds in Spirochetal and Trypanosomic Diseases.**—Reprinted from *Jl. Chemotherapy.* 1931. July. Vol. 8. No. 2. pp. 41–56. [58 refs.]

This paper opens with a general review of the history of the use of gold compounds in the treatment of disease. In the authors' own experiments an attempt was made to establish the therapeutic effectiveness of various gold preparations in syphilis and recurrent fever and in mice infested with *T. brucei*. The various gold compounds used and their toxicity and maximum tolerated dose in mice are set forth in a table. Graphic formulae of the compounds are also given. The following is the summary :—

" 1. In mice infected with *Spirocheta crocidurae*, a race of spirochetes closely related to *Spirocheta duttoni*, maximum tolerated doses of neoarsphenamine produce total destruction of the organisms only in a part of the animals. With neosilverarsphenamine, sterilization of mice infected with *Spirocheta crocidurae* is apparently not possible.

" 2. On the other hand, single doses of some gold preparations, particularly of solganal, bring about regularly the destruction of all the spirochetes present in the animal. However, while the doses required for a complete cure are well tolerated by healthy animals, they prove toxic to animals weakened by the infection.

" 3. We tried, therefore, to obtain increased curative action by combined neoarsphenamine-solganal treatment, and we found the mixture of neoar-

sphenamine and solganal capable of sterilization of mice infected with *Spirocheta crocidurae*, in doses very well tolerated by infected animals.

" 4. At the early stage of syphilitic infection in mice, the animals can be sterilized with neoarsphenamine and neosilverarsphenamine, as well as with some gold preparations, particularly with solganal and sanocrysin.

" 5. Late in the course of syphilitic infection in the mouse, *i.e.*, after the spirochetes have penetrated into the central nervous system, arsenobenzene compounds and gold preparations do not always produce sterilization.

" 6. It seems, however, that the neoarsphenamine-solganal mixture is capable of a total annihilation of spirochetes, including those present in the brain, at this stage also.

" 7. Sulfourea which is 4,4'-bis-(2-auromercaptobenzene-1-sulfonic acid)-urea, possesses not only spirocheticidal, but also trypanocidal properties.

" 8. A trypanosome strain (*Trypanosoma brucei*) treated with sulfourea for a long time, proved afterwards resistant to neoarsphenamine and germanin, but not to sulfourea." *W. Yorke.*

COLOMBO (U.). Activité de l'équipe antilarvaire de la brigade d'assainissement d'Elisabethville pendant les six premiers mois de son fonctionnement. (Février à juillet 1931.) [**Work of the Antilarval Brigade of Elizabethville in its First Six Months.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No. 2. pp. 113–131.

Information is given of the constitution of the brigade and its duties. In the six months it removed 28,043 empty receptacles from the town and its environs, chiefly bottles, tins and food containers. The " boys " of Europeans are chiefly responsible but responsibility is not easy to fix and the problem is rendered more difficult by the number of plots unbuilt on and houses unoccupied. In the same period 3,084 breeding places were found and destroyed; of these 17·3 per cent. harboured anopheles, 62·3 per cent. Culex and 20·4 per cent. Aëdes. The breeding grounds are classified as occurring in the European town, the native town, or the intervening neutral zone with the following result :—

	Anopheles per cent.	Culex per cent.	Aëdes per cent.
European town ...	35·7	54·6	88·6
Native „ ...	14·2	19·3	8·2
Neutral zone	50·1	26·1	3·2

The Anopheles hatched out in the laboratory were *A. costalis* 72 per cent., *A. maculipalpis* 25·9 per cent., *A. squamosus* 1·7 per cent., *A mauritianus* 0·1 per cent. The Aëdes were *Ae. aegypti* 88·4 per cent., *A. simpsoni* 11·6 per cent. The Culex were chiefly *C. duttoni*.

The breeding grounds are then classified as natural and artificial; in the natural there were 564 collections of larvae, 32 per cent. Anopheles, 8·3 per cent. Aëdes, and 59·6 per cent. Culex; in the artificial there were 2,520 collections, and here Anopheles were most numerous in the industrial breeding places, quarry pits and the like. The most frequent larval associations were *Ae. aegypti* and *C. duttoni* 47 *A. costalis* and *C. duttoni* 33, *A. costalis* and *A. maculipalpis* 34, *C.*

duttoni and *C. tigripes* 22. In his conclusions the author points to the urgency of sanitating the neutral zone, as the greatest reservoir of anopheles. *A. G. B.*

PALTHE (P. M. van Wulfften). Zenuwziekte in de tropen in verband met lagen bloeddruk. [**Low Blood Pressure in Conjunction with Nervous Disease in the Tropics.**]—*Nederl. Tijdschr. v. Geneesk.* 1932. May 7. Vol. 76. No. 19. pp. 2186–2192.

The author makes out a case for a definite clinical condition with a definite syndrome, which is to be found especially among those who have resided for long in the tropics. Nor is the condition at all uncommon. It is not to be put down as neurasthenia nor as an anxiety-neurosis. It has many of the symptoms associated with beriberi, but has nothing to do with that disease. The patient is ashamed of appearing before a doctor. His symptoms are variable and indefinite—extreme fatigue, tendency to childish manifestations such as proneness to tears, pains in the body and head, dizziness, fear of death, visual and auditory disturbances, sleeplessness or the contrary condition of sleepiness, nausea, vomiting and diarrhoea, sweating and others. More objective signs are a dermographic skin reaction, palpitation, a systolic blood pressure of 95 to 100 mm. and a diastolic of 55 to 60, dilated pupil, dilated retinal artery and rose coloured papilla. Many of these are the symptoms of low blood pressure and vasomotor atony ; the disease is named " essential hypotension " and is regarded as a disturbance of the equilibrium, an atony of the autonomic endocrine system. Treatment is by means of strychnine and mixed gland preparations, but not by adrenalin. Something of an avitaminosis is not altogether excluded and vitamine preparations are indicated. The use of pituitary posterior lobe preparations (vasopressine) may be of use. In the advanced cases a return to the home country may be obligatory. *W. F. Harvey.*

ERRATUM.

In the summary of the article on primary liver cancer in Java by Professor BONNE (*ante*, No. 7, p. 532) exactly the opposite meaning was regrettably given in the sentence :—

" As primary liver carcinoma and cirrhosis are very intimately connected, it may be that in Java alcohol is a causal factor in the production of both conditions."

This should be, in literal translation :—

" Liver cancer and cirrhosis are so constantly associated that a connexion must exist between both affections . . . . It may perhaps be noted that in Java alcohol can no more be regarded as a primary factor in the causation of liver cancer than of cirrhosis itself."